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Aleut settlement patterns in the western Aleutian Islands, Alaska

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ALEUT SETTLEMENT PATTERNS IN THE WESTERN ALEUTIAN ISLANDS, ALASKA

A

THESIS

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ALEUT SETTLEMENT PATTERNS IN THE WESTERN ALEUTIAN ISLANDS, ALASKA

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ABSTRACT

This thesis presents a settlement pattern analysis of prehistoric midden sites in the Near Islands, Alaska. It represents the only such study to date, which focuses on an entire island group inhabited by a distinct social/political entity. This is also one of the few settlement pattern studies to address maritime hunting-fishing people. Aerial photography was an important part of the analysis. Coupled with other site inventories, photographs were used to "survey" the Near Islands. A total of 106 sites, including 91 middens were located, with the middens forming the basis of the analysis. Site sizes and locations were correlated with a range of environmental and social factors, and functions and seasons of use proposed for about half the sites analyzed. Further elaboration of resource distributions could extend these predictions to more sites.

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INTRODUCTION

Anthropologists and archaeologists have been intrigued by the Aleuts and their islands for over 100 years. Considering the isolation and sparse population of the area, a surprising amount of work has been attempted; large collections of artifacts and human remains have been accumulated. Before World War II archeological work in the Aleutians was marred by a lack of scientific technique; most large collections have little or no provenience information, and many are not completely published.

After the war, William S. Laughlin began a multi-year, interdisciplinary program on Umnak Island. About the same time T.P. Bank II began surveying and testing sites all along the Aleutian chain. The late 1960s and early 1970s saw a flurry of excavation activity on Akun (Turner and Turner 1974), Atka (Veltre 1979), and Amchitka (Desautels 1970; Cook 1972). Since the 1970s archeological work in the Aleutians has consisted mainly of surveys and inventories of prehistoric and historic sites. Aleut adaptations, economic strategies and interactions with other organisms have received increasing attention.

This thesis is an attempt to synthesize the available archeological excavation and survey data for the Near Islands, the westernmost islands of the Aleutian chain. As in most of the recent work done in the islands, an ecological framework has been adopted for the synthesis. In consequence the environment is the critical element in the discussion which follows. Without understanding the complex marine environment of the Aleuts, other, less tangible aspects of their lives, religion, politics, history, and social life will remain incomplete. Analyzing the relationship between the environment and site size and distribution, I hope to address the following questions:

1) What factors determined site placement?
2) Can site function and season of use be determined using environmental data?
3) If so what variables are important in determining site function?
4) After isolating environmental variables are there aspects of site placement which can be used to infer social relationships and processes?

To aid this analysis various settlement pattern theories are described and applied to the data. In addition, general Aleut adaptation to the environment will be evaluated. These issues have potential bearing on the origins of cultural complexity and rise of complex hunter-gatherer societies, which are not addressed in this thesis. These questions are:

1) Could the Aleuts have exploited resources more intensively with their technology?
2) Were there resources the Aleuts could have exploited that they were not using?

This thesis is organized into seven chapters. Chapter One, Theoretical Background, briefly outlines a history of settlement pattern archeology and presents a few interpretive schemes commonly used by archaeologists. A review of the literature concerning Aleut settlement patterns concludes that section. A lengthy Environmental Setting follows, detailing the physical and biological environment of the Near Islands. This chapter is the foundation for the later analysis. The Prehistory chapter places the Near Islands in a framework of theoretical development and influences. Very little specific archeological information is known for this island group, but this is summarized at the end of the chapter. The section on Ethnography provides a sketchy empirical base for subsistence assumptions and inferences. In the Methods chapter I describe the techniques used to examine the sites and environmental variables. The Analysis chapter is broken into several categories, with a brief discussion for each section. It concludes with a longer discussion summarizing the analytical results. In the Conclusion I address the questions posed in the introduction and close with an outline of work needed.

THEORETICAL BACKGROUND

In 1945, at the urging of Julian Steward, who felt archeology could contribute to the "interpretation of nonmaterial and organizational aspects of prehistoric society," Gordon Willey agreed to undertake settlement pattern studies in the Viru Valley of Peru. His study proved the best vehicle for integrating the team's survey results and settlement pattern archeology was born. Willey defined settlement patterns as:

> *...the way in which man disposed himself over the landscape on which he lived. It refers to the dwellings, to their arrangement, and to the nature and disposition of other buildings pertaining to community life. These settlements reflect the natural environment, the level of technology on which the builders operated, and various institutions of social interaction and control which the culture maintained. Because settlement patterns are, to a large extent, directly shaped by widely held cultural needs, they offer a strategic starting point for the functional interpretation of archeological cultures (Willey 1953:1).*

Settlement pattern studies expanded archeological research beyond concern with artifact typologies and chronologies, and focussed on sites as isolated phenomena. The aims of settlement pattern archeology encompass virtually every field of human activity. Settlements reflected social and economic activities more directly than most types of artifacts. In addition to clarifying the relationships between technology and environment, social, political and religious systems could be addressed (Willey 1956:1-2). Ecological studies, concerned with human adaptations to the environment, focus on the distribution and typology of sites within a region. Social-ideological studies focus on patterning within sites and individual structures (Trigger 1968:53-78).

Parsons (1972:145) distinguishes settlement patterns from settlement systems, defining the former as the arrangement of sites over the landscape and the latter as the functional interrelationships of sites within the pattern. These functional interrelationships provide a framework for making sociological inferences and reconstructing cultural processes. The settlement system concept thus provides a basis for addressing specific problems.

Binford (1983) sees regional settlement patterns as the interaction between people and their environment. Based on data for small bands of hunters-gatherers, he refers to a 'scale of land use,' which is the total area used by a group through a cycle which may last several lifetimes.

Archaeologists are used to viewing the past from the perspective of a single site, and often have a difficult time visualizing the total area exploited by small mobile groups.

Binford (1980) divides hunter-gatherers into foragers and collectors, each with implications for settlement patterns and social organization. Foragers, usually small groups, move frequently between either a series of resource patches, or through large undifferentiated environmental zones. They gather food daily. Sites are ephemeral, with little internal functional variability. In addition to residential camps, foragers use 'locations', for specialized procurement activities.

Collectors store food and exploit widely separated clusters of resources. Rather than harvesting food opportunistically, task groups seek specific resources in specific contexts. In addition to residential bases and locations, collectors use field camps (temporary residences), stations (observatories) and caches (storage facilities).

Fitzhugh (1972:68-71) states that settlement patterns link a territory to social groups and subsistence systems. He views the patterns as unique to each society, as any minor environmental change will potentially change the whole system. Broadbent (1979:178) sees settlement patterns as a manifestation of demography and spatial organization; a groups economics are defined as an arrangement of social units across territory.

Watanabe (1972) stresses the importance of ideology in structuring settlement patterns. His economic analysis of the Ainu contains a great deal of information on settlement patterns. Ideological factors and cosmological principles structure house and settlement layout (See also Ohnuki-Tierney 1974). Hunting and fishing camps in the appropriate environmental zones are also located with regard to man/land/animal relationships.

Moss (1989) feels analysis of site function and regional settlement systems are critical to understanding the evolution of cultural complexity on the Northwest Coast. She has compared ethnographic information on Angoon Tlingit subsistence and settlement with archeological data and concludes that site typologies developed by archaeologists from ethnographic information are too simplistic, hiding settlement and economic complexity and ignoring changes and dynamics.

Regional studies require an intimate knowledge of the paleoenvironment, as well as a complete site survey. Ideally researchers should have a grasp of site function, chronology and demography, then the distributions of sites for each phase or period distinguished can be

plotted on maps for analysis. These data can be used to address questions relating to cultural ecology, culture history and economic change and adaptations.

INTERPRETIVE MODELS

Parsons (1972:146) noted the lack of a conceptual framework in archeology for interpreting settlement patterns. He urged close cooperation with ethnologists to derive models from historical and ethnological data for structuring research. Archaeologists have been relatively slow to follow this advice, instead borrowing several models from geography.

Central Place Theory

Central Place Theory assumes that even in simple societies, people want or need goods and services not produced locally. Service centers provide for the distribution of these goods and services, thereby minimizing the effort necessary to obtain them. In more complex societies they also serve as administrative, military or religious centers (Crumley 1979:151-157; Evans 1980:866-883).

Central Place Theory describes redistributive systems with a market economy; the success of the model is evaluated by the degree of fit with the real world. Basic assumptions include:

1) A regionally integrated market,
2) A featureless landscape with equal distribution of resources,
3) Suppliers maximize profits while consumers minimize cost
4) Suppliers satisfy requirements of demand and competition,
5) Centers form a hierarchy of at least two tiers,
6) The economy is a closed system,
7) Markets exist for the express purpose of exchange and are located accordingly, and
8) Population and purchasing power are equally distributed (Evans 1980:867-869; Bray 1983:167-193).

Thiessen Polygons drawn midway between centers describe the service area of a single center. Ideally they are hexagonal, but in reality they form irregular polygons. In a hierarchy, local centers are arranged around larger, second tier centers. In medieval England, markets

averaged 10 km apart, with second tier centers 13-16 km apart, and third tier centers 33 or more km apart (Hodder and Orton 1976:53-72).

Three organizational principles pattern hierarchies (Evans 1980; Hodder and Orton 1976:60-62). The market principle states lower tier centers have equal access to three higher tier centers. The transport principle locates a lower tier center between two higher centers, on the travel route between the two. Under the administrative principle a high tiered center draws on the resources of six lower level centers.

Within the limitations outlined in the models assumptions, Central Place Theory is most useful for explaining existing relationships in regional exchange patterns. Archeologically it may define relict patterns of economic and non-economic interactions between sites. Central Place Theory is unable to explain or describe a culture or predict site function. (Crumley 1979: 156-157). The assumptions of the model would seem to render it useless for analysis of any hunting-gathering economy. A modification of the basic idea might be used to explain distribution and control of scarce resources including, in the Aleutians, obsidian and amber.

Site Catchment Analysis

Site Catchment Analysis, defined by Vita-Finzi and Higgs (1970) is drawn from geomorphology and the study of watersheds. Unlike Central Place Theory which explains interactions between groups of people, site catchment explains human relationships to the land. A catchment is the area habitually exploited by the occupants of a site. The size, shape and location of the catchment area is based on the availability, abundance, spacing and seasonality of the resources exploited. The basic assumption is that humans exploit resources in a limited area around their habitations. Resources farther away cost more and are less used. However, there are some resources for which they are willing to pay more (travel farther). In catchment analysis, resources are classified in a hierarchy of importance.

Site catchment analysis is basically a set of analytical techniques rather than a predictive model. The first requirement is a clear definition of the territory to be analyzed. In most studies, a circle drawn at a selected distance, irregular contours based on travel time from the site, or a point midway between two sites defines the catchment. An adequate reconstruction of the paleoenvironment(s) is a necessary adjunct. Within the circle or contour, microenvironments are

defined and measured. Resources are weighted for distance, yields or seasonality and tabulated or graphed.

British archaeologists have used economic analysis to test culture historical reconstructions and have examined the economic basis of individual prehistoric cultures. American settlement pattern studies have traditionally been functional rather than historical, and catchment areas have been used to model the spatial distribution of functionally different sites and examine the resource potential of individual sites.

The theory has several problems. Hobler (1982) points out that it works best for farmers or for people without storage systems and is least applicable to hunter-gatherers with efficient long distance transportation, food storage, and intergroup exchange. Definition of catchment area, with the corollary of uncritically accepting often arbitrarily chosen distance figures, is the biggest problem. Flannery (1976) defined catchments in Mesoamerica by making an inventory of resources found in an excavated site and then locating the sources. He concluded that the areas habitually used by a site's inhabitants were generally much larger than assumed. Use of historical and ethnological information could also help define habitual use areas.

Jochim's Model

Michael Jochim (1976) developed his model to provide an explanatory and predictive framework for archeological analysis of hunter-gatherer sites. It is particularly useful when explicit subsistence and settlement information for the culture in question is lacking. Jochim's (1976:10) basic assumption is that economic behavior is based on rational choices and is therefore patterned. He focuses on the environment with the understanding that the definition of an exploitable resource depends not only on technology but on value systems. Subsistence and settlement are solutions to interrelated problems and he uses a wide ethnographic sample to define three problem areas and select relevant criteria for solutions.

Jochim (1976:19-22) defines the first of these problems the Resource Use Schedule, with two major and four secondary goals:

1) Attainment of a secure level of food and nonfood income,
2) Minimize expense in time or energy to achieve 1,
3) Secure good tasting food,
4) Secure a variety of foods,

5) Enhance prestige, and
6) Maintain sex role differentiation.

He provides a series of simple formulas to calculate the relative importance of individual resources, resulting in predictions of proportional use. The problem is then reduced to scheduling to take advantage of the resources in the most efficient manner. Noting changes in weight, mobility and aggregation size for various resources throughout the year, Jochim constructs an annual distribution of utilization. When all the resource distributions are graphed together 'economic seasons' can be identified. This is the basic structure of the economic year and settlement patterns (Jochim 1976:23-44).

The second problem faced by hunter-gatherers is Settlement Location. The form of the settlements must be adapted to the resources exploited. He cautions that models predicting location can only clarify general structural principles. Three goals determine location choices (Jochim 1976:50):

1) proximity to resources,
2) protection from the elements, and
3) need for a view or lookout.

Along with food resources, Jochim (1976:56-60) acknowledges the importance of fuel and water in structuring settlement decisions. He uses the Gravity Model to quantify the 'puli' of different resources and predicts site locations close to:

1) less mobile resources,
2) more dense resources, and
3) less clustered resources[1].

Within these guidelines a wide variety of choices can be made. Population density and distribution are not automatically determined by the environment, but are the result of choices. A group may use a variety of base camps moved relatively often, or a main camp with a series of satellites to exploit more distant resources. Jochim (1976:70) calls these choices Demographic Relations. Objectives guiding demographic decisions are:

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1 Less clustered resources are those such as waterfowl or fish, not found in large numbers in small or restricted areas. Locating settlements near these resources minimizes the effort needed to harvest them.

1) provision of food, for the group,
2) in the desired proportions,
3) with a high degree of security,
4) ensure reproductive viability, and
5) provide social interaction.

The key is carrying capacity, which is culturally defined. A regions supportable population is determined by calculating the biomass of major resources and their proportional contribution to human dietary needs. Jochim (1976:71-77) found a population is limited, not by average resource availability, but by the minimum. In particular, populations are limited to assure continued access to desired amounts of prestigious resources.

Jochim found a close fit between his assumptions and predictions and the actual behavior of the Round Lake Ojibwa. He then applied the model to an archeological example in Germany, and analyzed results from a sample of excavated sites. His conclusions support an application of the model to archeological data (Jochim 1976:83-186).

THE ALEUTIANS

Increasingly researchers class northern hunting/fishing peoples apart from more familiar tropical or subtropical hunter-gatherers (Renouf 1984:18-19). Many northern people are sedentary and live in large settlements with high population densities, defined territories, formalized leadership, and property rights. These societies rely on seasonally abundant resources requiring cooperation, sophisticated technology, and storage facilities for efficient exploitation. The Aleutians are an ideal place to test assumptions and settlement pattern models developed for northern hunter-fishers.

Settlement patterns have concerned nearly every researcher writing about the Aleuts. Father Veniaminov (1984:258-259), writing about the eastern Aleutians in the 1830s, reported that villages consisted of one to six communal houses occupied by up to 45 families. During the summer, families moved to smaller, single family houses within the village. Smaller "barabaras" were used for storage. Each village was guided by a chief. Several villages, whose inhabitants recognized common ancestry, formed a society (polity in Black 1984), with a head chief chosen from the oldest lineage. Before the arrival of the Russians some villages controlled subordinate

settlements. Veniaminov specifically mentions Makushinskoe (Volcano Bay Village) having five subordinate villages inside Makushin Bay (see also Martinson 1973).

According to Veniaminov all settlements in the Unalashka District were on the coast, in bays or inlets. Most, but not all had good boat landing beaches. Most villages were also on the north coasts of the islands and he thought this was due to greater fish, driftwood, and whale resources on the Bering Sea shore. He emphasized that "each village, without fail, has its own resources or means of subsistence near the village or, at least, not very far away" (p. 258), and lists two or three primary resources for 17 villages (Veniaminov 1984):

Resource	No. of Villages	Resource	No. of Villages	Resource	No. of Villages
sea fish	8	cod	3	sea lions	2
salmon	7	roots	3	bird eggs	1
shellfish	6	seal	3	greenlings	1
whales	4	geese	2		

Vladimir I. Iokhel'son (Jochelson 1925:21-23) states that fresh water and an observatory from which to scan for game and enemies were necessities in deciding site placement. Sites were also located on narrow isthmuses, ridges, promontories, or sandbanks to provide boat access to two bodies of water to aid escape in case of attack. Though no villages seemed to have been located at the heads of bays, seasonal fish camps were. After the arrival of the Russians settlements were moved to the heads of bays, near fish streams, for easier boat landings.

Ales Hrdlicka (1945:409-411) noted sites were found wherever conditions were suitable for occupation, and that they must number in the hundreds. Most sites were on an isthmus or at a stream mouth. They were generally only a few feet above storm waters but some were located on low, or high, bluffs.

William Laughlin noted sites reflected their contemporary sea levels. He related population size to the length and complexity of an island shoreline, though he considered population density to be approximately equal along the entire Aleutian chain (Laughlin 1975). In the eastern Aleutians, permanent villages with evidence of long stable occupations were found at superior locations. These areas required a protected water body (bay), with a fresh water lake and stream, strandflats, offshore islets and nearby cliffs. In addition to permanent villages the settlement system included alternate base villages used during different seasons, as well as seasonal hunting and gathering stations (Laughlin and Aigner 1975).

T.P. Bank II (1953a:247-248; 1977:5-7) noted that every island contained habitations, usually in bays, wherever there was protection from the worst storms. Even the rockiest offshore islet held evidence of occupation, sites Bank considered temporary fishing camps.

L.L. Johnson's recent work in the outer Shumagin Islands of the eastern Aleutians is the only study to examine the relationships between sites in a group of islands. To the criteria already listed for site locations, she adds salmon streams, protection from the sea, passes to other beaches, and low coasts with sufficient soil depth for house construction. Primarily concerned with the effects of seismic activity on human occupation of the islands, she notes an inverse correlation between tectonic activity and density of human use. During periods of rapid uplift, small scattered sites characterized the islands. Quiescent periods saw numerous medium to large sites in the group. Johnson also noted the first areas to be reoccupied fronted on deep oceanic waters and postulates the resources here, sea fish and migratory sea mammals, would be least disrupted by changes in shorelines. As coastlines stabilized, settlements were moved to areas where depth and turbidity changes affected shellfish and near shore fish populations. The three largest sites in the outer Shumagins are also located on the outer coasts. Three explanations are proposed: 1) fewer potential site areas on these islands require more intensive use of limited areas, making sites appear larger, 2) they are located to intercept sea mammals, 3) a larger population was necessary for protection, as these sites are at the most risk of attack (Winslow and Johnson 1989:297-318; Johnson 1988:139-170).

Charles Martinson (1973), a geographer, examined site locations, size, resources, and vegetation patterns in Makushin Bay, Unalaska Island, in an effort to gain insight into Aleut land and resource use patterns. His criteria for site locations mirrors those of other researchers. He determined the Makushin Bay Aleuts had a Central Based Wandering economy with sedentary permanent bases. They moved about to exploit resources but returned to the same locations at regular intervals. He concluded the sites in Makushin Bay represented an ecological unit with one large winter village, at Volcano Bay, characterized by defensive location sustained, medium level resource availability, and up to four summer villages.

Additional sites in the bay suggested the prehistoric population had fluctuated and, at times had been higher than at contact. This led to occupation of subsidiary winter villages inside Makushin Bay. Although the summer villages in Makushin Bay were used by the people from a single large winter settlement, Martinson believes the close spacing of sites indicated an ownership

structure with territories and resources allotted to the village. The ownership of resources would have fostered intervillage exchange.

Martinson felt the greatest potential threat from war was from the southwest, with lesser threats from the east, over the mountains. To offset the possible threat, Makushin Bay Aleuts may have formed strong social and economic ties to the villages of southwest Unalaska. From the settlement data Martinson concluded warfare was a winter phenomenon. He reasoned that people would be involved in food collection during summer and the enforced idleness of winter could be channeled into war.

Using data from Bureau of Indian Affairs surveys in the Near and Rat Islands, Fred Clark (1990) listed soil drainage and shellfish resources as important in site placement. Though the data did not break into clear categories, he used number of features to determine size, and assumed large, medium and small sites are winter village, satellite camps and resource procurement stations respectively. Noting that large sites were more common on the north coasts of the islands he suggests less oceanic swell, lack of tsunamis and protection from prevailing storm tracks were factors in locating sites.

Jean Aigner (1973), following work at Sheep Creek on southwest Umnak Island, proposed a tripartite settlement system organized around the concept of an "exploitational area." Over the course of a year, a community could be expected to use activity-specific, seasonal camps and limited occupation stations, in addition to the permanently occupied base camp. David Yesner (1977) examined the biological base of this settlement scheme. He predicted the base camps or villages would be located in areas of highest resource diversity and density, with seasonal camps in intermediate areas, and limited duration stations in areas of the lowest diversity. Over time, the functions of the villages and stations would remain stable, while seasonal camps might vary between permanent settlement, camp and station status. The pattern in the western islands varied from this as a result of decreasing diversity, though not necessarily density, of resources. Information for the Near Islands is incomplete, but for the Andreanof and Rat islands he proposed a twin site pattern, with movement between two settlements in a year.

Rita Miraglia's M.A. thesis (1986) reviews the literature on site typology and settlement patterns. Source information is incomplete and terms are generally poorly defined, but she proposes a typology of villages, temporary camps, observatories, refuges, and caves. Villages are subdivided into winter and summer settlements. Winter villages have storage facilities, burial

pits and, in the western islands, ceremonial structures. Summer villages are distinguishable by their generally smaller size. Both types of village are characterized by mounds of food remains and a distinctive vegetation community. Temporary camps are poorly defined and almost unstudied. Miraglia's examples include caves used by hunters, and a non-midden site with greasy soil and firepits, noted by Hrdlicka on Agattu. Refuges are inaccessible offshore rocks; observatories are high areas near villages. Caves were used for a variety of purposes, including shelter, storage, ceremonies and, in the eastern islands, burials.

Using this typology, Miraglia proposes a seasonal round involving a community exploiting several sites on a number of islands. The community would use, in addition to a winter village, one or more summer villages, an observatory and refuge, several temporary camps and storage caves.

McCartney has discussed site locations and settlement patterns in the chain and along the Alaska Peninsula (McCartney 1972; 1974a). Though recognizing that many and complex variables guide human behavior, he focuses on spatial and ecological variables, as those most accessible to archaeologists. Lacking precise knowledge of Aleut seasonal movements, he looks at each site as a complete cultural entity (McCartney 1977). He assumes large sites are stable villages and small ones are seasonal camps.

He has noted a more or less even distribution of sites along the Aleutian chain. Every island group, though not every island, was occupied. Sites are rare on volcanic cones, and islands less than 1/2 mile square were not permanently occupied. Accessibility of the site to people using boats is determined by the elevation and beach configuration. Noting a correlation between sites and low coastlines, he estimates only 5-10% of the shoreline in the chain is suitable for occupation. Sites on Amchitka almost always fall on low coasts (below 30m), with 54% of the sites under 13m. Virtually all sites had a beach and level ground for houses. Also, the majority of the sites were in bays, evenly split between north and south sides of the island. The direction a site faces relative to the sea, its aspect, becomes important during inclement weather when visibility is obscured and boat launchings are made difficult. Other prime determinants for site placement appeared to be surf patterns and resource availability. Except for height and beach conditions, however, there did not appear to be any clustering of sites at geographical locations or association with modern faunal distributions (McCartney 1974a, 1977).

McCartney (1977) specifically excludes most food resources, including sea mammals and shellfish, as well as fresh water, from consideration in determining site locations. Because no island is totally lacking in resources used by the Aleuts, suitability for human occupation is based on its relative productivity, and he suggests two ways to measure this. The first, based on the ratio of island coastline to area, is called the Index of Irregularity. As the ocean/land interface was the most productive environment, the longer an island's shoreline the more attractive it was for occupation. Amchitka has one of the highest Index of Irregularity ratios in the Aleutians, 11.27. Attu has the highest individual Index in the Near Islands, 8.4, and should be the most suitable island for occupation. However, the Semichi Islands, taken as a group have a very high ratio, 11.07, which makes them the most suitable "island" for occupation (Table 1). A second measure indirectly evaluating the biological productivity of an island is the number of sites per kilometer of coast. The more sites an island supports, the richer its resources would have been. The kilometers of shoreline to site ratio indicates Attu was less desirable than either the Semichis or Agattu.

Table 1 - Index of Irregularity and Shoreline to Site Ratios

Island	Index	Km/site
Attu	8.44	5.77
Agattu	7.84	3.67
Semichis	11.07	2.62
Alaid	6.46	2.24
Nizki	7.49	3.28
Shemya	5.9	2.48

To summarize, most researchers have considered 10 variables in relation to Aleut settlement placement:

1) Coast (N, S, E, or W)
2) Resource Availability
3) Defense
4) Fresh water
5) Observatory-for game as well as enemies
6) Boat Landing beach
7) Protection from storms
8) Room and soil development for houses
9) Passes to other beaches
10) Elevation and Beach configuration

Most of the criteria (1, 5, 6, 8, 9, 10) relate to the physical geography of the sites and islands. Four (2, 4, 5, and 9) relate to economics, two (3 and 5) to social factors and one (7) to climate.

McCartney was the only researcher to suggest sea conditions, specifically surf patterns, had any influence on site placement.

Few researchers explicitly state their views on site function or typology, though all agree the Aleuts occupied stable villages, punctuated by briefer stays at less permanent camps. Most consider large sites to be winter or permanent villages and small ones to be temporary or resource procurement camps. Those intermediate in size may be summer villages, satellite winter villages or seasonal camps. Settlement pattern schemes based on data from the better known eastern Aleutians have become prototypical. Yesner was the only one to suggest differences in settlement patterns exist in the various parts of the chain. Except for large village midden sites, and some umqan and cave burials, other site types are unstudied.

ENVIRONMENTAL SETTING

LOCATION AND DESCRIPTION

The Aleutian Islands stretch nearly 1700 km west from the tip of the Alaska Peninsula to the Near Islands, so named for their proximity to Kamchatka. The five small islands of this group form a rough triangle, with Attu Island at the northwest, Agattu at the south and the Semichis, Alaid, Nizki and Shemya, in the northeast. Attu is 2590 km southwest of Anchorage, and 1000 km east of Petropavlovsk, Kamchatka, USSR (Figs. 1 and 2). The 225 km stretch of ocean between the Rat and Near islands is broken only by lonely Buldir, 108 km east of Shemya, making the Near islands the most isolated in the archipelago. To the west, 360 km of open ocean separate Attu from Copper Island in the Soviet Commander group.

Attu is the largest of the Near Islands and the fifth largest island in the chain (Sekora 1973). It is mountainous with peaks topping 1000 m in elevation. Most of the coast is precipitous, plunging steeply into the ocean. The relatively smooth north coast is broken only by Holtz Bay, Sarana Bay and Chichagof Harbor at the northeast end of the island. The steep south coast is broken by large river valleys, Etienne, Abraham, Nevidiskov, and Temnac, opening into large bays with the same names. The eastern end of the island, around Massacre Bay, is relatively flat and low lying. Reefs and rocky islets ring the coast.

Agattu, roughly triangular with the apex at the western end, lies 37 km southeast of Attu. Most of the island is a gently rolling plateau which, after rising abruptly to an elevation of 61 m on the south shore, gradually slopes to 180 m elevation on the north coast. The east half of the north shore rises to over 580 m in a jagged range of low mountains. Short streams connect many of the lakes dotting the plateau and drain into the ocean. Small boulder and cobble beaches are found at the heads of the many small bays and bights bisected by these streams. The shoreline is rocky and steep with reefs virtually ringing the entire coast.

Alaid island lies 27 km east of Attu and comprises a low tundra plateau with two "peaks" at the western end rising to 180 m in elevation. Alaid is linked to Nizki by a sandbar exposed at low tide. This low flat island has a maximum elevation of 50 m. Shemya which lies 3 km east of Nizki is flat on the south and west but rises to nearly 80 m above sea level in the north. The cliffs on

the north coast drop to a wide flat wave-cut platform. These three islands form a nearly continuous "island" 19 km long. Long stretches of sandy or gravel beaches broken by low rock outcrops characterize the coasts. Numerous lakes dot island interiors; the few streams are very short. Reefs ring the islands, extending nearly 2 km offshore in places (Table 2).

Table 2 - Island Dimensions

Island name	Length (km)	Width (km)	Area (km^2)	Shoreline (km)
Attu	70	25	906.1	254
Agattu	32	18	224.8	117.5
Alaid	5	1.7	5.9	15.7
Nizki	5	1.7	6.9	19.7
Shemya	6.3	3	14.3	22.3

From Sekora 1973

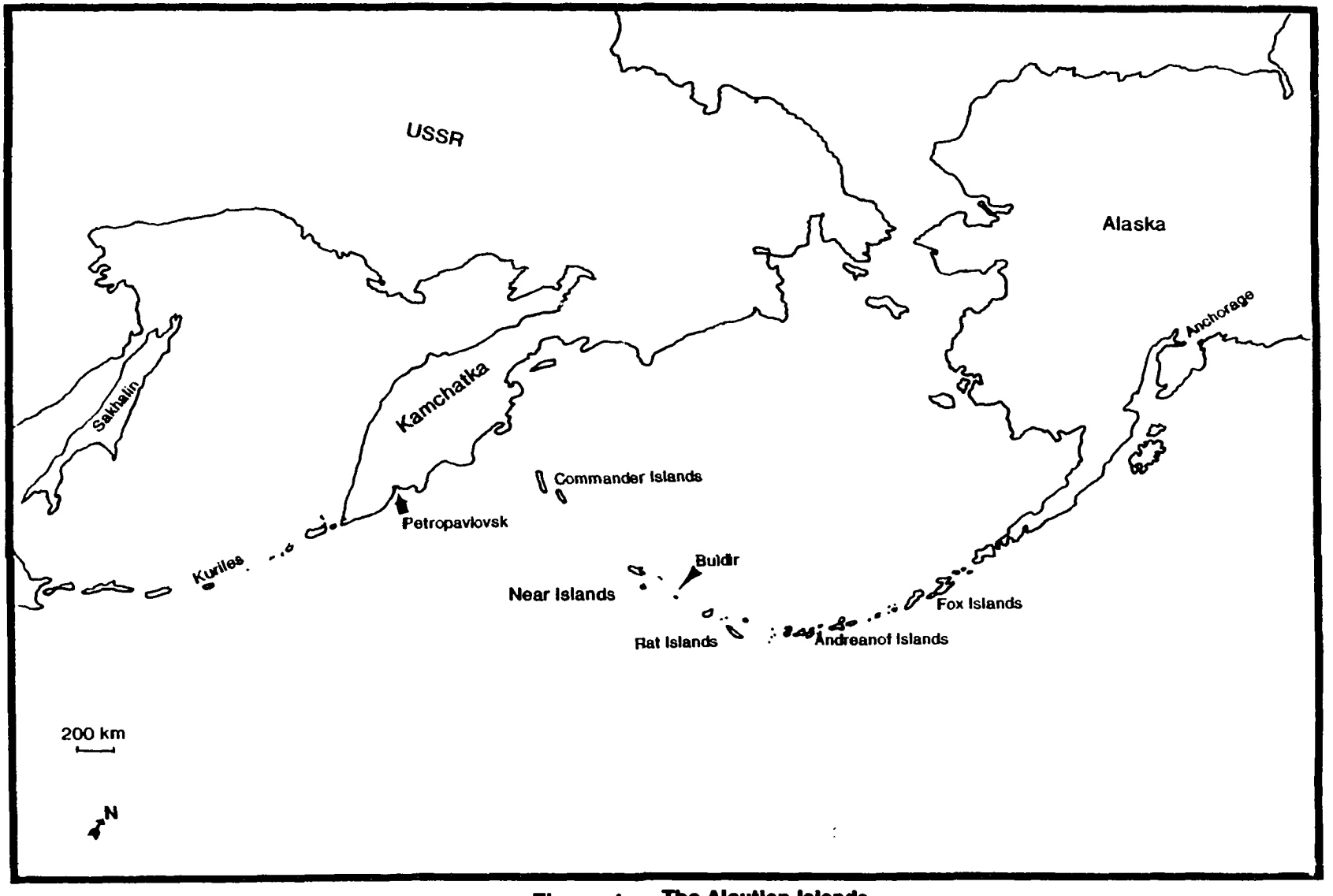

Figure 1 The Aleutian Islands

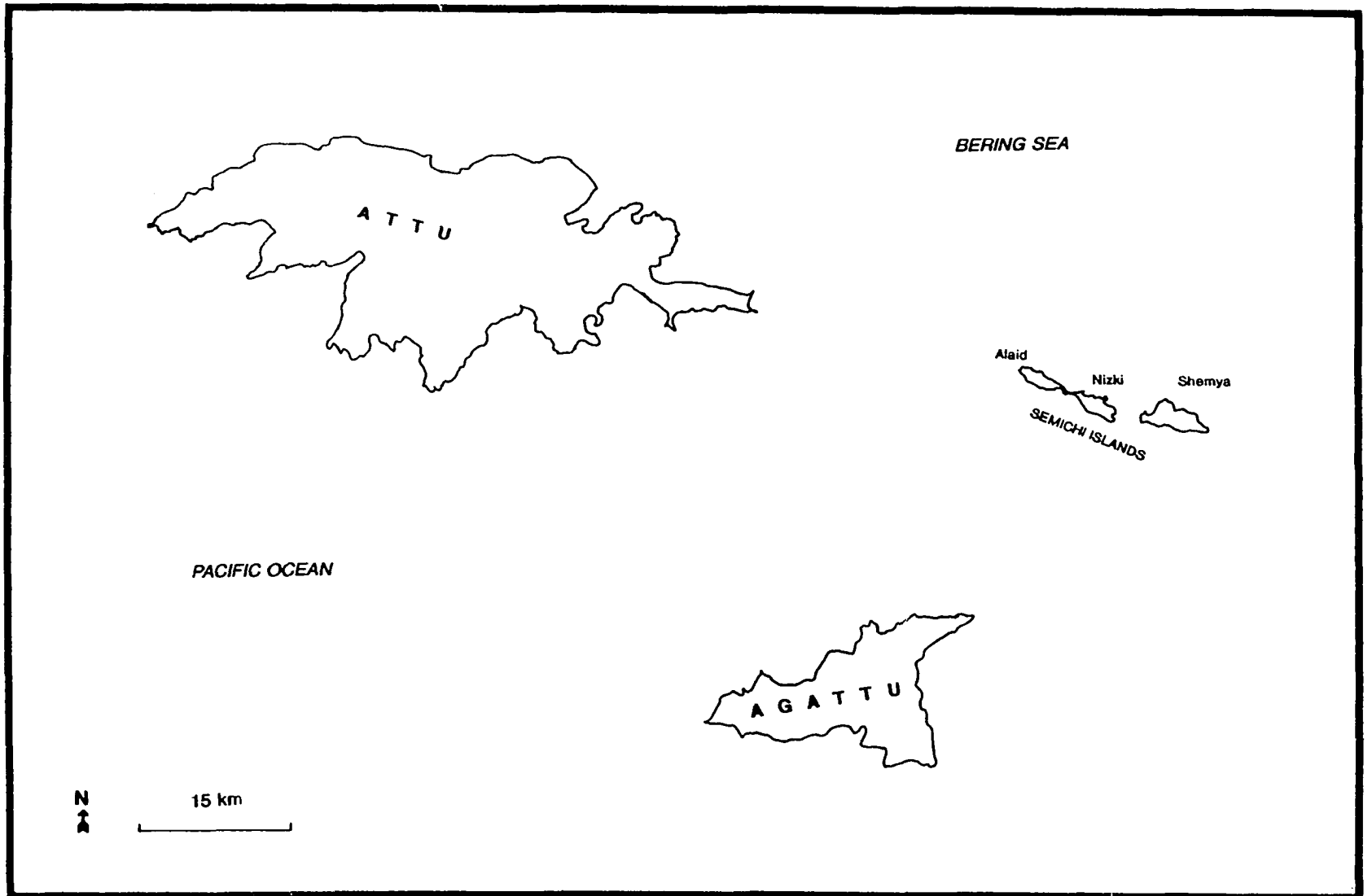

Figure 2 **The Near Islands**

PHYSICAL ENVIRONMENT

Bedrock Geology and Tectonics

The Aleutian Islands are the emergent peaks of a submarine volcanic arc rising from the Aleutian Ridge. The island arc marks the subduction zone between the North American and Pacific Plates. Buldir and the Near Islands occupy a single fault-bounded structural block which tilts, forming deep sea canyons east of Buldir and west of Attu (Carr et al. 1971). The islands are surrounded by an insular shelf up to 128 m (70 fathoms) in depth. The Aleutian Ridge, up to 900 m (500 fathoms) deep between the islands, is a flat bedrock plain with scattered sand deposits (Gates and Gibson 1956).

During the Pliocene, 5-2 mya, a period of uplift accompanied by widespread volcanism, gave many Aleutian Islands their modern forms (Carr et al. 1971). The Near Islands are unique in lacking volcanoes. However, concurrent with Pliocene tectonic activity, gabbros and granites were emplaced on Attu, and a few small andesitic lava flows were extruded on Attu and Shemya (Gates et al. 1971). Tectonic activity continues to elevate shorelines in the Near Islands. On most islands uplift has been minor but terraces on Attu have risen 3-7 m since the late Pleistocene (Carr et al. 1971; Morris 1971). In addition seismic activity anywhere in the Pacific Ocean, or on Kamchatka, may generate tsunamis. Between 1944 and 1973, 25 tsunamis were recorded on Attu and Shemya. Average runup height of the waves was 0.5 m, with maximums between 0.1 m and 3.2 m at Massacre Bay and 0.1 to 10 m on Shemya (Cox and Pararas-Carayannis 1976).

Each island has a distinct, albeit similar, assemblage of rocks. The distribution of rocks provide important information on lithic material sources. Basement rocks on Attu comprise a heterogeneous sequence of 1) fine sediments, such as chert, siliceous siltstone, argillite, limestone and tuffaceous graywacke, 2) coarse sediments and 3) pillow lavas and tuffs. The Chirikof Formation contains carbonaceous shale, sandstone and pyrite, with trace amounts of galena, chalcopyrite and native copper. Sharply defined beds of siliceous marine sediments are found at Chuniksak Point and Northeast Bluff. These include shale, argillite, limy argillite, chert, siliceous siltstone, sandstone and sandy shale. Rocks at the western end of Shemya include finely banded argillite, limy argillite, and siltstone with cherty sediments and graywacke at Alcan Harbor.

Bedrock on Agattu consists of 1) coarse sediments, 2) fine sediments, such as siltstone, mudstone, silicified argillite and chert, 3) volcanic tuffs and breccias, weathered to a light green color, and 4) columnar and pillow basalts. Overlying rocks contain beds of clay, silt and fine sand, cemented by silica or carbonates. Basalt is exposed at Cone Peak, Monolith Point and McDonald Point.

Quartz porphyry, diabase, hornblende andesite, and dacite porphyry occur in dikes on Attu. On Agattu, large sills of diabase and gabbro, bleached and silicified neighboring rocks, turning tuffs to amphiboles (hornfels). Small pipes of columnar basalt are found on the north and east coasts of Shemya (Gates, et al. 1971).

Geomorphology

Since the Miocene, the islands have been sculpted by erosional forces, primarily the sea. The southern two thirds of Agattu comprise a preglacial wave cut platform 60-180 m above sea level. Terraces 60-80 m above sea level are visible on the southern headlands of Attu. The Near Islands were covered by a glacier probably originating in the highlands of Attu during the Wisconsin Glaciation. The minimum age for glacial retreat, based on four carbon dates from peat on Attu, range from 6695+-200 BP to 4400+-145 BP. This is 6000-9000 years younger than deglaciation elsewhere in Alaska and may reflect slow soil development due to the wind. In any case the islands were probably ice free at least 7000 years ago (Thorson and Hamilton 1986:180-184). Alpine glaciers on Adak and Umnak advanced and retreated in the last 3000 years. Whether the Attuan glaciers grew during this period is unknown (Thorson and Hamilton 1986:188).

Sea level fluctuations are complex and poorly understood. Tectonics, isostatic rebound and global sea level changes complicate the picture. R. Black (in Thorson and Hamilton 1986) contends sea levels reached modern levels around 6500 BP on Attu, then rose another two to three meters before returning to modern levels between 4000 and 2800 BP. This data is contrary to the sequence interpreted elsewhere in Alaska but without additional work the problem cannot be resolved (Thorson and Hamilton 1986:186). Patterns of sea level changes and tectonic uplift influence site placement and survivability through time. These changes also influenced the availability of resources to the earliest people occupying the islands (see L. Black 1981).

Climate

The Aleutian climate is maritime, with cool wet summers and mild winters. Temperatures rarely fall below -12 C or rise above 15 C. Weather is largely controlled by large scale pressure systems and associated weather fronts. Warm moist air from the Pacific Ocean colliding with cooler Arctic air forms nearly continuous cloud cover, dense fog and high winds. Island topography creates local variations in wind speed and direction, and precipitation (Armstrong 1977). Table 3 illustrates the variation possible on even one island.

Aleutian winds are legendary, with the most violent storms in early winter, November and December. "Hurricane velocities (75 MPH) occur on all of the islands from two to fifteen times a year" (Beaudet 1960:19). In addition, katabatic winds, called williwaws, build up on windward mountain slopes, then pour down the lee slope at hurricane speeds. They occur suddenly and without warning, primarily on mountainous islands with precipitous shores (Beaudet 1960; NOAA 1987). High or sudden winds and fog were of immediate importance to the Aleuts. Prolonged periods of bad weather could leave hunters landbound, leading to hunger and even starvation. Hunters caught at sea in storms were in danger of capsizing; a lost mans dependents suffered great hardships.

Table 3 - Near Island Climate Data [1]

Average monthly measurement	JANUARY Attu		Shem[3]	FEBRUARY Attu		Shem
	MB	CH[2]		MB	CH	
wind speed	13.8	-	20.9	14.1		20.2
wind direction	W	S/SE	NE	N	S/SE	S/SE
temperature	23.5	31.7	31.3	26.7	31.9	30.2
maximum temp	41	42	40	39	41	39
minimum temp	21	17	22	17	21	22
precipitation	6.6	5.2	2.3	2.5	2.9	0.7

	MARCH Attu		Shem	APRIL Attu		Shem
	MB	CH		MB	CH	
wind speed	13.4	-	19.6	7.9	-	17.6
wind direction	N	N/NE	E/SE	W	N/NE	NW
temperature	33.0	29.0	32.2	34.2	36.7	34.6
maximum temp	42	41	41	43	52	41
minimum temp	22	21	21	25	26	25
precipitation	3.7	2.4	1.0	1.4	2.2	1.8

Table 3 - Near Island Climate Data [1] (Cont.)

	MAY			JUNE		
	Attu		Shem	Attu		Shem
	MB	CH		MB	CH	
wind speed	9.7	-	16.1	8.6	-	13
wind direction	N	S/SE	NW	N	-	NW
temperature	38.7	39.5	38.3	46.4	-	42.2
max. temp	48	49	46	52	-	49
min temp	32	31	32	37	-	36
precipitation	2.1	1.2	1.7	2.5	-	1.9

	JULY			AUGUST		
	Attu		Shem	Attu		Shem
	MB	CH		MB	CH	
wind speed	7.0	-	12.9	7.4	-	13.1
wind direction	W/SW	W/NW	W/SW	S	W/NW	W/SW
temperature	47.0	52.4	46.6	46.6	51.2	48.9
max temp	61	66	60	57	66	56
min temp	42	42	40	43	38	20
precipitation	4.5	0.0	0.7	4.6	4.6	3.4

	SEPTEMBER			OCTOBER		
	Attu		Shem	Attu		Shem
	MB	CH		MB	CH	
wind speed	11.1	-	15.1	11.9	-	19.5
wind direction	N	S/SE	W/NW	W	N/NE	W/SW
temperature	47.4	47.8	47.5	41.0	41.1	41.3
max temp	48.6	58	56	57	49	51
min temp	40	36	20	25	30	26
precipitation	4.0	4.0	0.3	1.0	8.9	0.4

	NOVEMBER			DECEMBER		
	Attu		Shem	Attu		Shem
	MB	CH		MB	CH	
wind speed	12.5	-	19.8	13.7	-	20.4
wind direction	W	N/NE	W/NW	W	N/NE	S/SW
temperature	33.5	35.5	35.3	34.5	33.9	32.4
max temp	42	46	41	44	44	42
min temp	22	25	23	21	22	21
precipitation	8.0	6.7	0.8	5.0	6.5	2.9

[1] All temperatures in degrees Fahrenheit, precipitation in inches and wind speed in miles per hour.

[2] Values for Chichagof Harbor by Turner 1886. The rest from NOAA 1973, 1985, and Alaska State Climatologist.

[3] Shem = Shemya, MB = Massacre Bay, CH = Chichagof Harbor

Oceanography

The resources used by the Aleuts depended on the marine environment. The resource rich waters surrounding the Aleutian Islands were based on a unique combination of submarine topography, current flow, winds and mixing of waters from two different seas.

Circulation in the North Pacific is dominated by the eastward flowing Subarctic Current, but the Aleutian region is a complex mix of Pacific Ocean and Bering Sea currents and eddies. The Subarctic Current forms when the cold, south flowing Oyashio and the warm north flowing Kuroshio meet off the northeast coast of Honshu Island, Japan (Figure 3). The combined currents bend to the east, splitting into the California Current and the Alaska Stream, off the Canadian coast. The Alaska Stream circulates around the Gulf of Alaska and heads west along the south side of the Aleutians. Part of this current turns south at the tip of the Alaska Peninsula, and again in the Central Aleutians closing the circle of the Alaska Gyre. South of the Rat Islands, a branch of the Subarctic Current turns north, joining the Alaska Stream and closing the Western Subarctic Gyre. All along the Aleutians small streams are diverted north through the passes between the islands (Favorite et al. 1976).

Local features are less well known; some may appear at certain seasons and be absent during others, some may have periodicities of several years. Currents are generally weak, they move slowly and are greatly influenced by winds. Tides on the other hand are strong and in narrow island passes can achieve speeds of several knots.

Tectonics can also effect currents, especially near islands. As one short term effect, earthquakes cause "water" or unusual, and dangerous, currents in intertidal passes. Long term effects result when an earthquake alters shorelines or submarine features, creating long term changes in local currents (Black 1981:316-317).

Around Agattu, waters are dominated by weak currents influenced by the winds. Tidal forces lack constricting island passes that give rise to unpredictable currents. Around Attu and the Semichis conditions are very different. Tides and the mixing of Pacific Ocean and Bering Sea currents create swift turbulent conditions near the islands. The narrow pass between Shemya and Nizki is treacherous due to the narrow strait and numerous reefs and shoals. Currents between Attu and Alaid average two kilometers per hour but grow stronger around Chirikof Point. A mix of currents and tides characterize Cape Wrangell where tidal velocities reach six kilometers per hour. Along the north coast of Attu the current flows east or southeast in calm

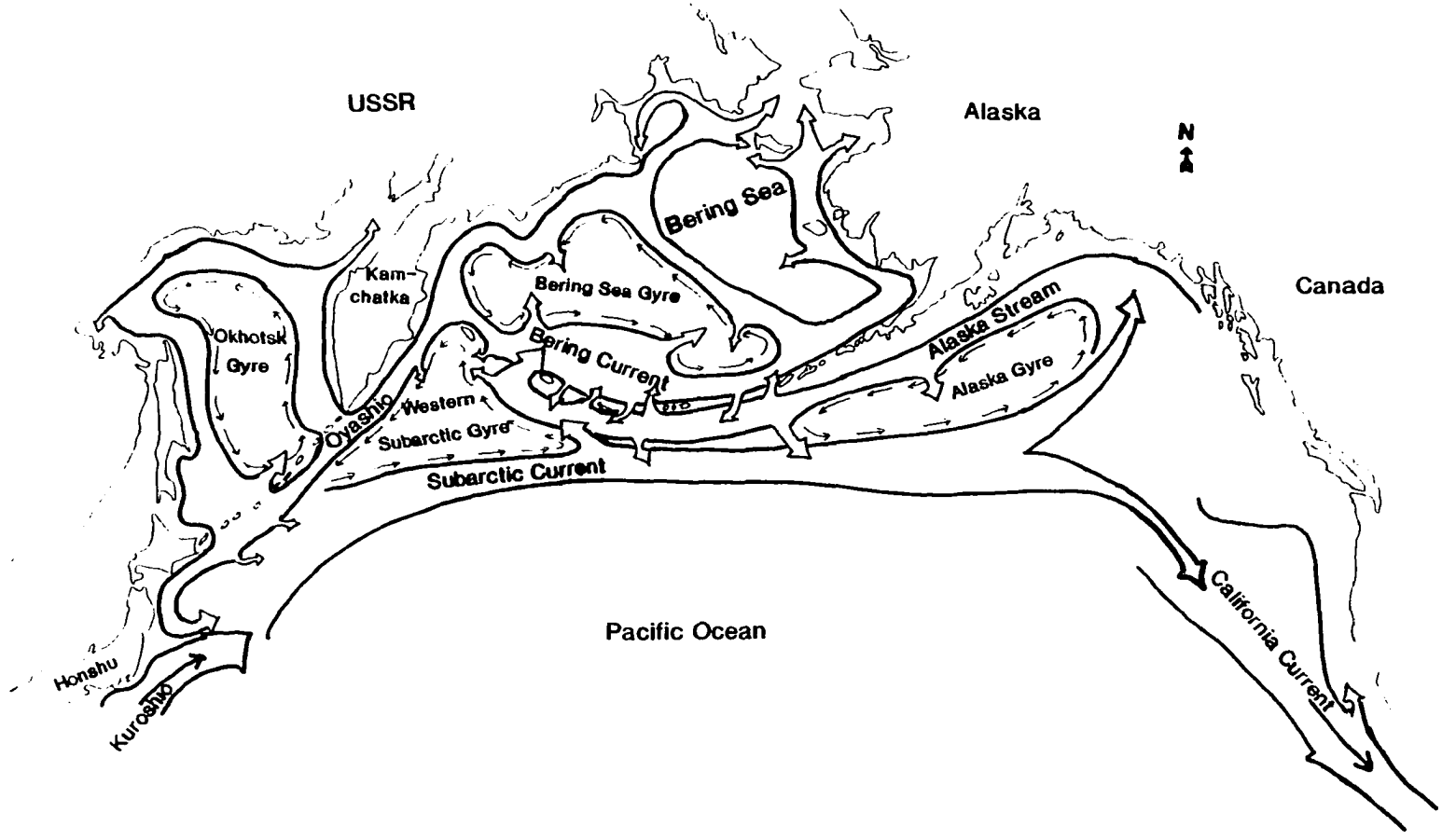

Figure 3 North Pacific Current System

weather but is strongly influenced by winds and may be reversed during westerly winds. To the south, weak currents flow west during the summer; winter conditions are unknown.

Strong tides meeting resistance near shoals, headlands and offshore islets are called rip tides and swirls (Russian suloi). Choppy water, standing waves, and whirlpools characterize these areas during the flood and ebb of tides. Wave rebound from sea cliffs is similar to riptides and can be felt far offshore. This would be of particular concern at the west end of Attu.

Most of the 39 Aleutian passes (straits between islands) are shallow, effectively blocking the flow of intermediate and deep waters between the oceans. The three deepest passes, Amchitka, Near and Commander, all over 1000 m deep, channel the bulk of the waters into the Bering Sea. Bending north around Attu, nearly 80% of the Alaska Stream flows through the Near Island Pass to mix with the eastward flowing Bering Current (McAlister and Favorite 1977). Small branches of the Bering Current eddy south, pushing cold waters through the interisland passes. In the winter these currents push the Alaska Stream offshore, and east flowing countercurrents form south of the Aleutians (Favorite et al. 1976).

As the Subarctic Current flows north and west around the Gulf of Alaska it is diluted by large volumes of fresh water from copious rainfall and numerous rivers. Average ocean salinity, measured in grams of salt per kilogram of water is 33.4 - 33.8 parts per thousand (ppt); 33.0 ppt indicates dilution (Favorite et al. 1976). At the western end of the Alaska Peninsula the concentration is 32-32.6 ppt, though off Attu Island salinity levels have risen to 33.2 ppt. The Bering Sea typically has salinity levels in excess of 33.0 ppt (Dodimead et al. 1963; McAlister and Favorite 1977). Most open ocean organisms have narrow limits of tolerance to salinity ranges (Odum 1959:331).

Water temperatures vary seasonally but the Alaska Stream is warm with a mean surface temperature off Attu in March, the coldest month, of slightly over 4 C. In August, the warmest month, temperatures reach 12 C. Average temperatures in the Bering Sea, by comparison, are 2.7 C in winter and 3.8 C. in summer (McAlister and Favorite 1977). In March water temperatures in the Bering Sea dip to -1 C, and the cold water isotherm may extend past Attu, bringing drift ice with it (Favorite et al. 1976).

Aleutian tides are diurnal with one high and one low peak per day. They also typically display a narrow range with less than 1.5 m between high and low tide (O'Clair 1977). Each island varies somewhat from the others (Table 4).

Table 4 - Near Island Tides
(measured from mean low tide)

Location	Highest Mean Tide	High tide	Lowest tide
Chichagof Harbor	1.13 m	.55 m	-.91 m
Stellar Cove, Attu	1.13 m	.55 m	-.91 m
Etienne Bay, Attu	1.13 m	.55 m	-.91 m
Massacre Bay, Attu	1.01 m	.49 m	-.91 m
Alcan Harbor, Shemya	1.04 m	.52 m	-1.07 m
McDonald Cove, Agattu	1.04 m	.52 m	-.91 m

From NOAA Navigation charts

BIOLOGICAL ENVIRONMENT

Cold waters deflected through the island passes force tongues of cold, nutrient-rich waters into dilute, warm, oxygen-rich waters. The passes act as simple estuarian systems, creating conditions of greater biological productivity than either ocean possesses alone (Favorite et al. 1976). in spring increasing solar radiation stimulates massive plankton blooms, forming the base of a rich, diverse food chain. Productivity is highest south of Adak, with 400-500ml of plankton per 1000 cu. m of seawater. Off Amchitka the figure is 40.7 ml per 1000 cu.m, which probably approximates productivity off Attu (McAlister and Favorite 1977).

Microenvironments

Marine and terrestrial environments in the Near Islands may be broken down into 16 microenvironments. The Aleuts exploited organisms in all of these, though some were of greater importance. In general terrestrial environments are of lower productivity than marine. Most species are found in several microenvironments, but are most typical in one or two (Amundsen 1977; O'Clair 1977; Simenstad et al. 1977). A brief description of each follows:

Crowberry Tundra is the most extensive terrestrial environment. It does not possess a uniform type of vegetation; the dominant species crowberry, mixes with mosses and lichens and grasses or shrubby plants in varying proportions depending on drainage and exposure. This tundra type is found from sea level up, grading into Alpine Tundra.

Alpine Tundra begins to replace crowberry tundra at about 75 m asl. The transition is not abrupt, depending on exposure and drainage. Above 300 m wind stress severely limits plant growth.

Wet Tundra is found in flat low lying areas with poor drainage.

Beach Ridges are vegetated; Beaches unvegetated, shorelines. Both are above the high tide line, but exposed to storm tides and salt spray. They are uncommon on all the islands, and usually occur at the heads of bays and mouths of rivers and streams. Beach soils are variable, with compositions including mud, sand, gravel and/or boulders.

The **Riparian Zone** consists of lush herbaceous vegetation along streams and rivers.

Cliffs and small **Islands** have similar vegetation and fauna. Cliffs are steep, vegetated or unvegetated, slopes at the oceans edge. Islands are rocks with soil and vegetation, surrounded by water at low tide.

Lakes, standing fresh water bodies, and **Streams**, flowing fresh water, are common on all the islands. Streams are narrow and short; up to 3.5 km long on Agattu. Temnac, Nevidiskov and Abraham Rivers on Attu are 7.5 to 13 km long, and wide and deep enough for baidarka travel.

Reefs are the rocky interface between land and sea, by turn exposed and covered by the tides. Reefs up to 2 km wide ring all the islands. They encompass sea stacks, tide pools and surge channels.

The **Inshore Rocky** environment is an extension of the reefs continuing below the lowest tides to depths of 100 m below sea level. It is broken by cliffs, terraces and rock pinnacles. Kelp forests are common in waters shallower than 20 m.

The **Demersal Rocky** environment is rock covered sea bottoms 55 to 220 m. below the surface. The broken bottom is covered with sponges, corals and other sessile animals.

Inshore Sandy environments range from the surface to 55 m below sea level in bays, along coasts between kelp beds and on canyon bottoms. They share with **Demersal Sandy** areas below 55 m, soft bottoms with low relief and little encrusting growth.

Littoral Waters extend from the island shores to 4 km offshore. **Pelagic Waters** are those beyond the littoral. Pelagic also refers to waters deeper than 200 m below the surface. Epipelagic waters are those just below the surface which receive some light from the sun.

Flora

Both floral and faunal communities in the Aleutians are geologically young, having colonized the islands since the glaciers melted (by 7000 years ago). Colonization continues with new arrivals entering the chain from both east and west. The ends of the chain differ from each other and are more diverse, in terms of both plants and animals, than the central islands (Hulten 1937).

The Aleutians belong to the same vegetational province as Kamchatka. This relationship is most clearly seen in the Near Islands with several species not found further east. Vegetation communities are primarily influenced by drainage and exposure. In sheltered areas, and the wide valleys of Attu, Asian species of False hellebore (Veratrum album), ragwort (Senecio palmatus), and mountain ash (Sorbus sambucifolia), with Kamchatka thistle (Cirsium kamschaticum) and Cacalia auriculata grow in dense thickets. Wet Tundra characterized by sedges, reedgrass, blueberry and horsetail, grades into heath, or Crowberry Tundra. The dominant species, crowberry, combines with lichens, mosses, blueberry, cranberry, lycopodium, sedge, anemone, lupine, reedgrass and a host of flowering plants in a complex mosaic covering most of the islands' surfaces. Above 75 m plants are smaller and more widely separated.

Beach ridges, cliffs and islands, and other areas subject to disturbance and salt stress, are cloaked with a distinctive vegetation community dominated by beach rye grass, cow parsnip, angelica and Kamchatka thistle. Below the grass zone, carpets of beach pea, bluebells, senecio and scurveygrass cover the sand. Stream banks are lined with dense thickets of willows, angelica, fireweed, cow parsnip, lupine, huckleberries, violets and speedwell (Hulten 1937; 1968; Amundsen 1977).

The cold clear waters offshore support a lush growth of marine vegetation. Rockweed (Fucus) and sea lettuce (Ulva) are the most common reef seaweed. Kelp (Alaria) grows in deeper waters (Lebednik and Palmisano 1977).

Laughlin (1980:49) estimates less than 5% of the calories in the Aleut diet consisted of plant foods[2]. Lantis (1984:176) suggests the percent was somewhat higher. Bank (1977:26) reports

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2 Laughlin provides no base for these estimates. Various other articles give different numbers, and these are probably a synthesis from these. The estimates are probably educated guesses based on years of experience excavating Aleut sites and working with living Aleuts.

the Aleuts were more sophisticated in their use of plants than were Eskimos. He lists 85 species of plants used for food, medicine, poison and manufactures. Some Yupik Eskimos in areas with a similar density and variety of plants derived nearly 8% of their calories from plants (Fitzhugh 1984:18). Though a minor contributor of calories, plants were important sources of vitamins, fiber and variety in the predominantly meat and fish diet. They had valuable medicinal properties and some had ritual uses. Grasses and possibly some other plants were used for weaving, floor coverings and bedding, and to roof houses. Driftwood was the only source of wood for house and boat construction as well as for tools and containers. Crowberry, sedges and driftwood were used as fuel.

Fauna

The fauna of the Aleutians is rich and varied. Virtually all fauna are dependent on the sea. Terrestrial fauna is limited. Brown bears and caribou are found on Unimak Island in the eastern Aleutians, but in the Near Islands arctic foxes (Alopex lagopus) and rats, both introduced, are the only land mammals. The range of sea mammal, fish and shellfish species found are similar throughout the Aleutian chain (Sekora 1973). Unusual ice conditions in some winters may allow animals normally associated with pack ice to appear in the Aleutians, particularly the eastern and western islands.

The range of bird species found is generally similar along the chain also. The Near Islands, at the eastern edge of the Japan-Kurile-Kamchatka flyway, are regularly visited by Asian species found nowhere else in North America (Gibson 1981).

Archeological data from sites on Umnak, Amchitka and Agattu indicate no significant change in the faunal assemblage over the last 4,000 years. Volcanism and tectonism, minor climatic changes and human hunting have undoubtedly caused local and regional fluctuations, however the overall environment and biotic communities have been stable (Yesner 1977).

Mammals

Several mammal species are year-round residents of the Aleutians. Three were of primary importance to the Aleut: sea lions, harbor seals and sea otters. Laughlin (1980:49) estimates 25-

30% of the Aleut diet was derived from sea mammals. At Ashishik Point, a hunting camp, Denniston (1974) found 57% of the faunal remains were sea mammals. In addition to meat, mammals provided hides for boat covers, bones and teeth for tools and ornaments, sinew for thread and line, and various organs for clothing and containers.

Sea lions have historically exhibited long term population fluctuations. Yesner (1988:38-39) noted a decline in sea lion populations in the eastern Aleutians during the late prehistoric period, probably due to overhunting. In the 1830s Veniaminov (1984:276,354) reported so few of the animals were found in the eastern islands, that hides and meat were imported from the Pribilofs to make up the shortfall. Netsvetov (1980:37) about the same time also reported imports of sea lion hides and meat on Atka. L.M. Turner (1886) reported low sea lion populations in the Near Islands in 1880. In the 1970s both sea lions and seals were believed to be at the carrying capacity for the Aleutians (Sekora 1973). In the 1980s the populations declined precipitously prompting the US Fish and Wildlife Service to declare the animals Threatened and entitled to Federal Government protection. Table 5 presents sea lion population estimates from aerial surveys for several years, and Figure 4 shows rookery locations. Harbor seals in the Near Islands were estimated to number 2000 animals in 1959.

Sea otters, decimated by hunting, were locally extinct by 1900 (Lensink 1966). Today the population numbers 3000, primarily around Attu and Agattu (James Estes, 1991 personal communication). The Near Islands are believed capable of supporting a population of 4000 to 5000 (Sekora 1973).

Other resident mammal species include Pacific white sided, Dalls and Harbor porpoises, Cuviers, Bairds and Bering Sea beaked whales, and Sperm and Killer whales. Most large baleen whales, Blue, Fin, Sei, Minke, Humpback and possibly Gray and Bowhead whales, were present seasonally, usually during the summer (Leatherwood et al. 1988).

Fur seals pass through the islands in the spring and again in fall. Roughly 80% of northern fur seals breed in the Pribilof Islands, but 20%, or 400,000 animals, haul out in the Commanders. In winter the herds are found off the coasts of California and Japan. Up to 30% of the animals off Japan, about 200,000 seals, are from the Pribilofs, and regularly migrate through the Near Islands (Baker 1963).

Table 5. Sea Lion Populations for a 20 Year Period

	1959[1]	1965[1]	1972[1]	1978[2]
Attu Cape Wrangeil	5000a	4000	6900	
Chirikof Pt.	10b		1500	
south coast	--	--	85	
Chichagof H.	--c	--	900	
Agattu Gillon Pt.	3000d		750	1500
Otkriti Pt.	100e	1300	--	--
Cape Sabak	3300f		8635	8100
Alaid	1500g	2500	2500	4800
Shemya	2500h	2000	650	
Total	15,410	9,800	21,920	14,400

1 Sekora 1973,
2 Day et al. 1979
letters correspond to locations on Figure 5

Ringed and bearded seals, usually associated with pack ice further north, have been reported in the Aleutians (Murie 1959). Walrus, also associated with sea ice, formerly hauled out in the Pribilofs, and early Russian sources report sporadic occurrences in the Near Islands. Historic walrus range has contracted north, probably in response to hunting pressure in the late 1800s (Fay 1955; Brooks 1954). As late as the 1930s, Aleuts reported walrus hauled out on Agattu in the winter (Wright 1988). These animals probably appear in the Near Islands during winters when the sea ice extends farther south than usual.

The Russians reported that sea cows were common in the Commander Islands at contact and were also known from Avacha Bay, Kamchatka (Stellar 1988). The, large slow animals were exterminated in the Commanders within 26 years of their discovery (Sauer 1802:181). They were reported as rare visitors to the Near Islands in the 1760s (Liapunova 1979). One of Turners' (1886) elderly Attuan informants reported that her grandfather saw the animals in the Near Islands, probably in the late 1700s or early 1800s.

The only land animals in the Near Islands are polar or arctic foxes and rats. Arctic foxes were introduced to Attu from the Commander Islands in 1750 by Andreian Tolstykh (Black 1984:75). As trade in otter pelts reduced the availability of their fur for Aleut domestic use, foxes became important as a replacement. They also formed a valuable export for the Russian trade. Fur prices dropped shortly before World War II broke out, and trapping did not resume after the war.

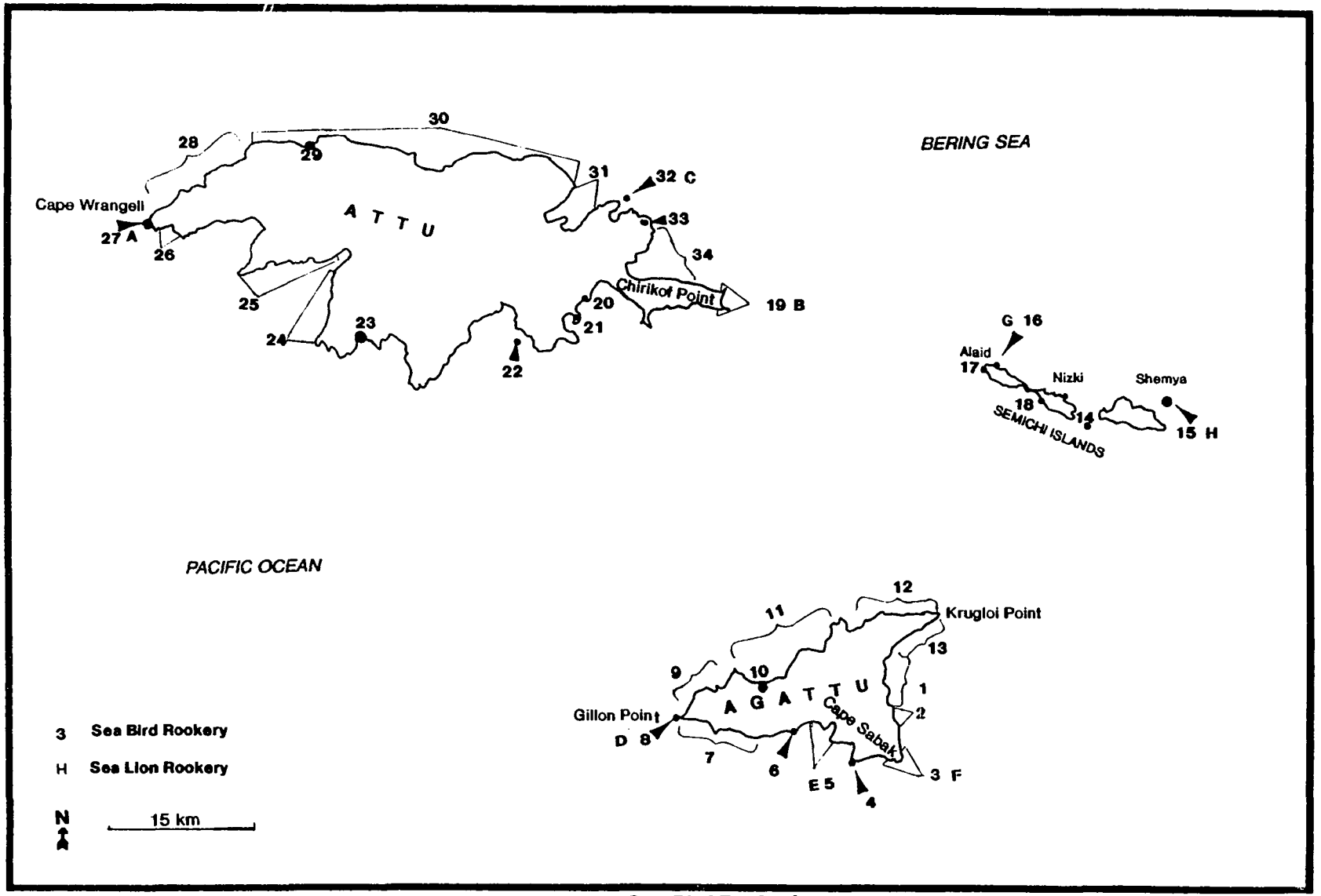

Figure 4 Sea Lion and Sea Bird Rookeries

The USF&WS began a fox eradication program on several islands in the 1970s. Today Agattu, Nizki and Alaid are free of foxes (Mike Boylan, Refuge Manager, personal communication 1988).

Birds

Over 180 species of birds have been recorded in the Aleutian Islands. Of these, 129 species are regular migrants of which 54 species breed in the chain. Another 25 species, mostly terrestrial, are year-round residents. The rest are rare visitors, mostly from Asia and seen only in the Near Islands (Byrd and Day 1986; Gibson 1981). Many resident species are divided between island groups into subspecies which become larger and darker away from the American mainland. The Near Island sparrow is the largest in the world (Murie 1959).

According to Laughlin (1980:49), birds and eggs comprised 15-20% of the prehistoric Aleut diet. At Aishishik Point, Umnak, they were a negligible part of the diet; comprising only 2% of faunal remains recovered (Denniston 1974). Birds provided skins for clothing and bones for tools. Feathers were used for decoration and often had symbolic meaning.

Terrestrial birds consist primarily of small passerines and large birds of prey. Most inhabit the crowberry tundra biome. Ptarmigans are the only "game" species. There is no census information for the Near Islands, but work at Amchitka found six to seven ptarmigan per 250 acres. A similar ratio for the Near Islands yields a total population of 4,000 to 5,000 birds, primarily on Attu and Agattu. The most common terrestrial species, Lapland Longspurs, averaged 0.5 individuals per acre on Amchitka (White et al. 1977). A similar ratio in the Near Islands, excluding alpine areas on Attu, yields an estimated 87,000 birds. Most terrestrial species were of minimal economic importance but some were mythically significant and had ritual or symbolic uses (Turner 1886).

About 40 species of migratory waterfowl and shorebirds nest in the lowlands and lakes between May and October. The emperor goose winters in the chain. Until recently the most abundant waterbird in the Near Islands was the Aleutian Canada Goose. Turner (1886) reported thousands of these birds in the lowlands of Agattu and the Semichis. Table 6 lists, in relative order, the most abundant species.

The most remarkable wildlife resource in the Near Islands are pelagic birds, which rarely come to land except to breed. A 1972 survey estimated 4.9 million of these birds in the Aleutians, 250,000 in the Near Islands, with major colonies on Attu and Agattu (Figure 5). In addition 3.5

million of these birds nest on tiny Buldir Island to the east (Sekora 1973; Sowl et al. 1978). Table 7 lists the most abundant species from the Near Islands and Buldir. Populations for the Near Islands are averages of USF&WS estimates spanning several years (Trapp 1975; Day et al. 1979; Forsell and Ambroz 1983; Zeillemaker 1986).

Table 6. Near Island Waterfowl

1.Aleutian Canada Goose	6 Rock Sandpiper
2 Emperor Goose	7 Harlequin Duck
3 Eider Duck	8 Pintail Duck
4 Green Wing Teal	9 Scaup
5 Mallard Duck	10 White Wing Scoter

From Zeillemaker 1986; Forsell and Ambroz 1983; Day et al. 1979; Trapp 1975.

Table 7. Pelagic Bird Populations

Species	Near Islands	Buldir
Cormorant	93,268	500
Murre	36,182	13,400
Tufted Puffin	31,500	10,000
Kittiwake	19,630	13,000
Horned Puffin	10,648	10,000
Petrel	7,943	1,500,000
GlaucusWing Gull	5,455	5,000
Aethia auklets	3,883	85,000
Fulmar	2,565	620
Ancient Murrelet	2,361	10,000
Shearwater	2,018	-
Parakeet Auklet	153	6,000
Albatross	152	-

From Sowl et al. 1978

Fish

Laughlin (1980:49) estimates 25-30% of the Aleut diet was derived from fish. Desautels (1970) found fish rivalled sea mammals in importance on Amchitka, and at Ashishik Point (Denniston 1974) they comprised 40% of the faunal assemblage. Fish resources in the Aleutians are both abundant and diverse. Four species of salmon, silver, red, pink and chum, spawn in the Near Islands, with pinks and chums thought to be the most common (Sekora 1973:173). Attuans reported large runs of silvers on Agattu, and reds and silvers on Attu (Golodoff 1988). In addition, huge numbers of salmon, including Kings, migrate through Aleutian waters from spawning areas in Kamchatka, Bristol Bay, and the eastern Aleutians. The migrants move west along the south side of the chain in spring, then turn north through the island passes on their way to their rivers of origin for spawning. The numbers are low until June and peak in early July. A second peak of immature salmon occurs in September (Sekora 1973:197-198).

Ninety two species of fish, including the five salmon, were identified from marine waters off Amchitka (Simenstad et al. 1977:456). A wide range of complex environmental variables, including water temperature, salinity, depth, and type of ocean bottom, determine where and when fish will be found. Figures 5a and 5b illustrate some of these differences (Ronholt et al. 1982). In general, rocky ocean bottoms support a larger number and diversity than sandy bottoms, 41 vs. 24 species. Shallow waters are also more diverse than deep, with 37 vs. 28 species (Simenstad et al. 1977).

Pelagic fish aggregate in large schools and perform seasonal migrations (Odum 1959:350). These include many of the more valuable species, such as salmon, cod and halibut. Halibut move into deep waters during the winter, cod are close to shore in spring. Salmon are present offshore during the summer. In addition, fish populations fluctuate from year to year. Herring occur in large numbers every three years, and salmon are more abundant in even numbered years. Cod and Atka mackerel may show the same long term fluctuations as sea lions. Turner (1886) reported abundant cod and mackerel off Attu where for years there had been none and credited low sea lion populations for the change.

Most resident species, greenlings, sculpins and rockfish occupy reefs and shallow rocky waters. Wilderbuer (1986) reports Pacific Ocean Perch formed 62-73% of the rockfish biomass in the western Aleutians from Attu to Amchitka. These fish were more abundant in the Pacific Ocean than the Bering Sea, though the latter were larger. Four other species, shortraker, northern,

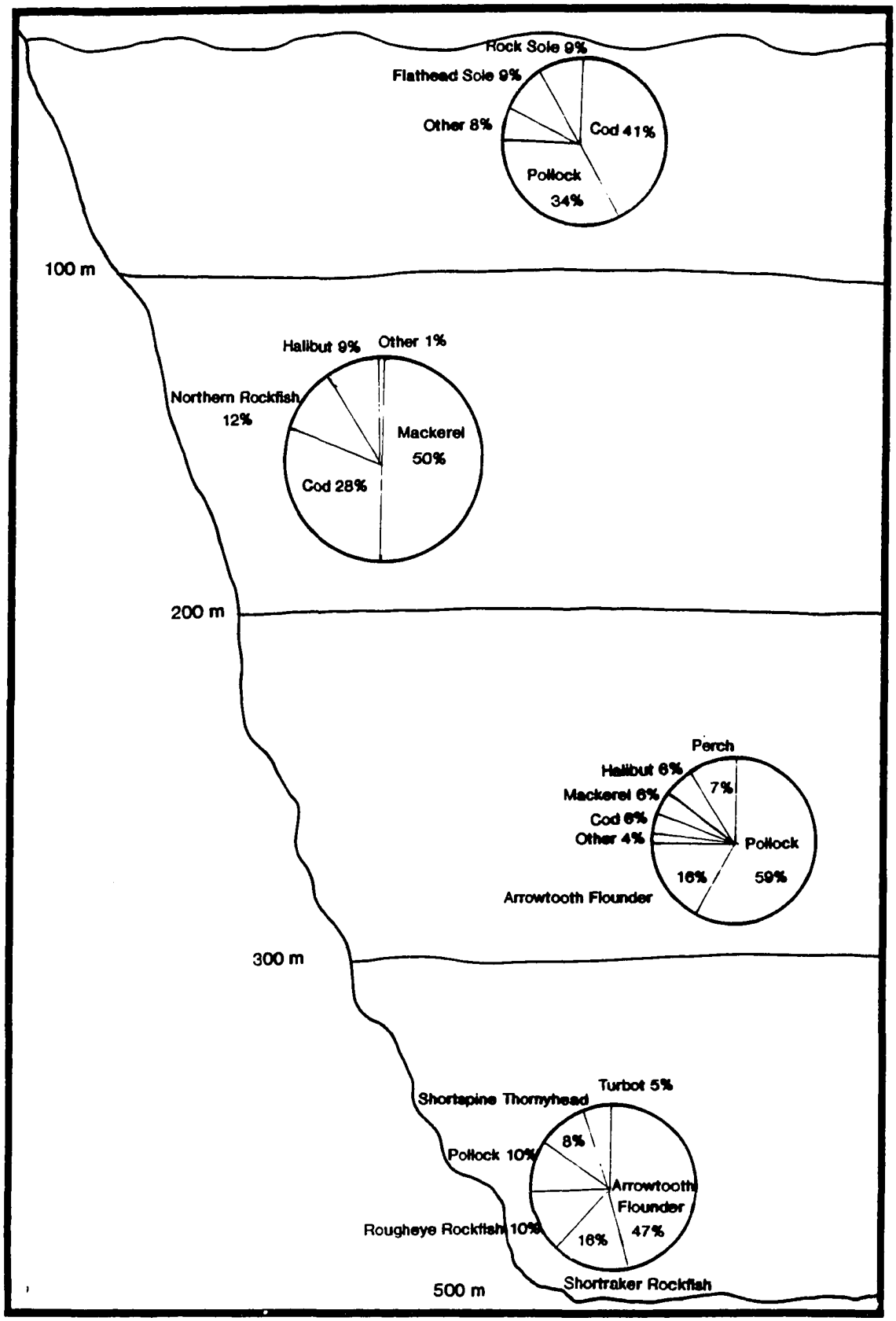

Figure 5a Pacific Ocean Fish Distributions

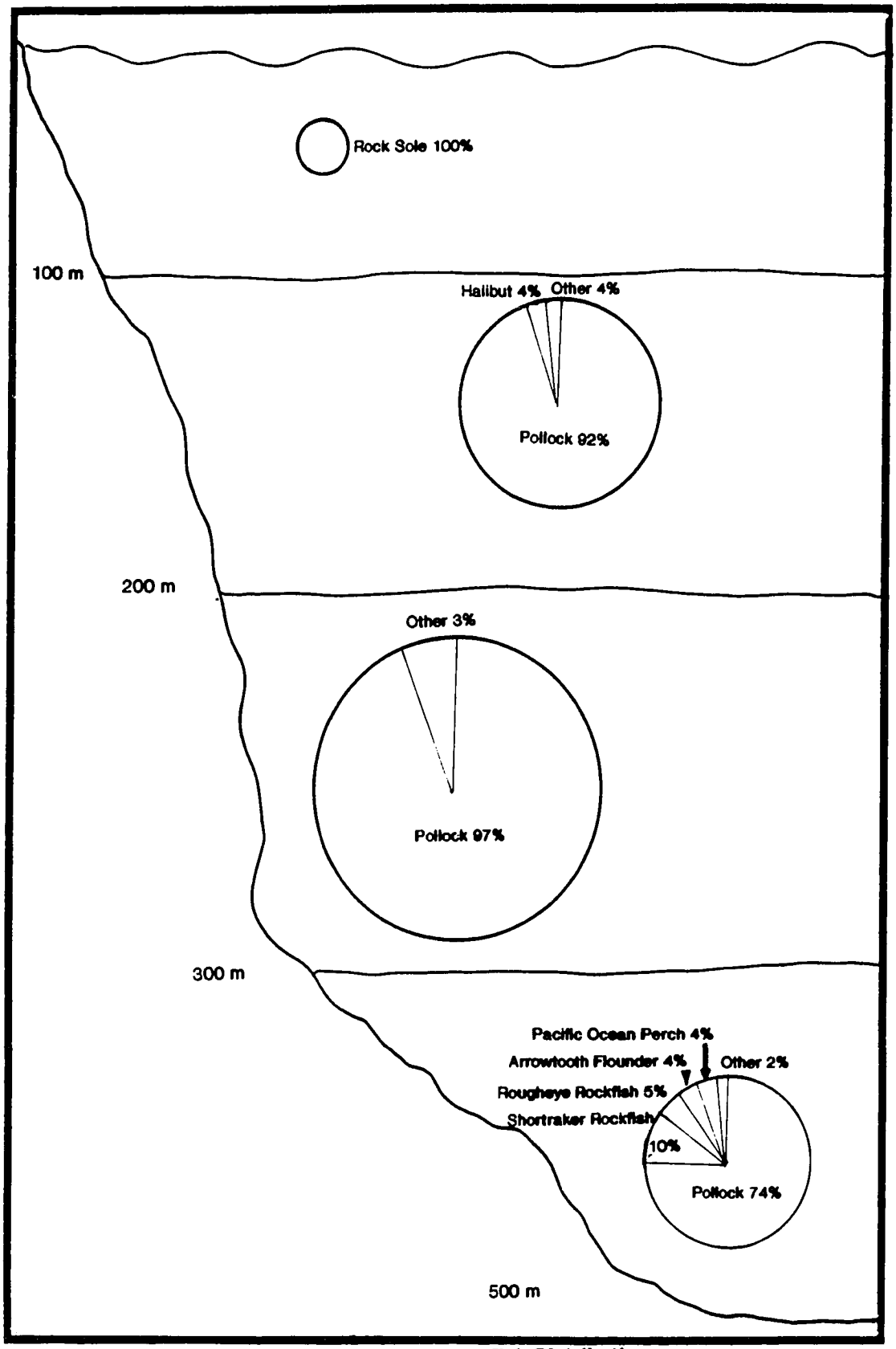

Figure 5b Bering Sea Fish Distributions

and rougheye rockfish and shortspine thornyheads were far less abundant but, except for rougheyes, more common in the Pacific Ocean, they were evenly distributed between oceans.

Shellfish

Shellfish comprised 15 to 30% of the Aleut diet and their remains, mainly sea urchin, make up much of the matrix of midden sites (Laughlin 1980:49). They are considered low status, or famine food by most researchers, but provided an abundant resource, easily procured, all year round, by otherwise nonproductive members of the community. Though notoriously low in calories, they are rich sources of protein and minerals.

With the exception of some species of clams living in muddy or sandy bottoms, virtually all shellfish were found on the rocky reefs fringing island shorelines. With the small tidal ranges of the Aleutians, these reefs greatly expand available shellfish habitat. Reef productivity is high; total biomass of the Nikolski strandflat on Umnak Island, without any sea otter predation, has been estimated at 1.62×10^9 grams (1.62 million kilograms). Urchins at Nikolski average 27 kg/m^2 and about 80 mm in diameter (Love 1976). Comparable estimates of total biomass productivity are not available for the Near Islands. However, sea urchin mass on Shemya is estimated at 12.3 kg/m^2, with 95% over 50 mm in diameter. Attuan sea urchins are larger, approaching the size of the Umnak animals. (O'Clair 1977). Palmisano and Estes (1974) recorded barnacle and mussel densities of 1215 and $722/m^2$, with 78 sea urchins and 38 chitons per square meter on Shemya reefs.

Reefs are complex biotic environments (Figure 6). Animals and plants are distributed in zones dependent on the amount of exposure during low tides. The supralittoral fringe, covered only during high tides, is dominated by rockweed and periwinkles. The infralittoral zone uncovered only during the lowest tides supports kelp, whelks, and sea urchins. The largest urchins at Shemya are found on tide pool walls and at the bottom of surge channels 2-3 meters below mean high tide. The littoral zone covered and uncovered daily, supports most of the other reef animals; urchins here are more numerous but smaller. Access to these resources depends on the tides, and organisms in the infralittoral zone may only be available for a few days during the lowest monthly tides.

Predation by sea otters can severely impact the abundance of shellfish on a reef. Sea otters on Amchitka number 20 to 30 animals per square kilometer of habitat. These animals eat 35,000

kg/km2/year of shellfish and fish. Otter predation at Amchitka has reduced sea urchin populations to a thin scatter of small individuals. The otters there have turned to fish, especially those species found in kelp beds, for a large percentage of their diet. Amchitka kelp beds support dense populations of rock greenling, and the seals that feed on them. Bald eagles, dependent on beached animals for food, are also more abundant in areas with large kelp beds. Where few urchins are found, Emperor geese, seaweed grazers, increase in numbers (Palmisano and Estes 1974). The expanded kelp beds shelter shorelines from wave action, and sediments once washed out to sea settle near shore, hampering the growth of intertidal marine animals. Without otter predation sea urchins reduce the size of the kelp forests, increasing wave action on the coast and permitting establishment of sessile marine invertebrate communities. Eider ducks, which prey on urchins, increase (Figure 7). Palmisano and Estes (1977) noted eiders were the most abundant duck in the Near Islands, while seals and eagles were scarce. Uncontrolled sea urchin populations lead to local extinction of several types of organisms, the resulting simpler ecosystem is unstable.

Yesner (1977) has discussed Aleuts as a predator on both otters and urchins. Palmisano and Estes (1977) doubt the Aleuts were effective competitors with the otters for the urchins. As predators of the otters, however, they were certainly effective. Although most Aleut groups did not eat sea otters, their furs were used for clothing and their bones for tools. Yesner postulates a cyclical relationship; high otter populations led to increased hunting by the Aleuts. When populations were low, the Aleuts ate shellfish. More complex interaction may have involved Aleuts "managing" otters to maximize production, not only of seals and kelp fish, but also of intertidal invertebrates.

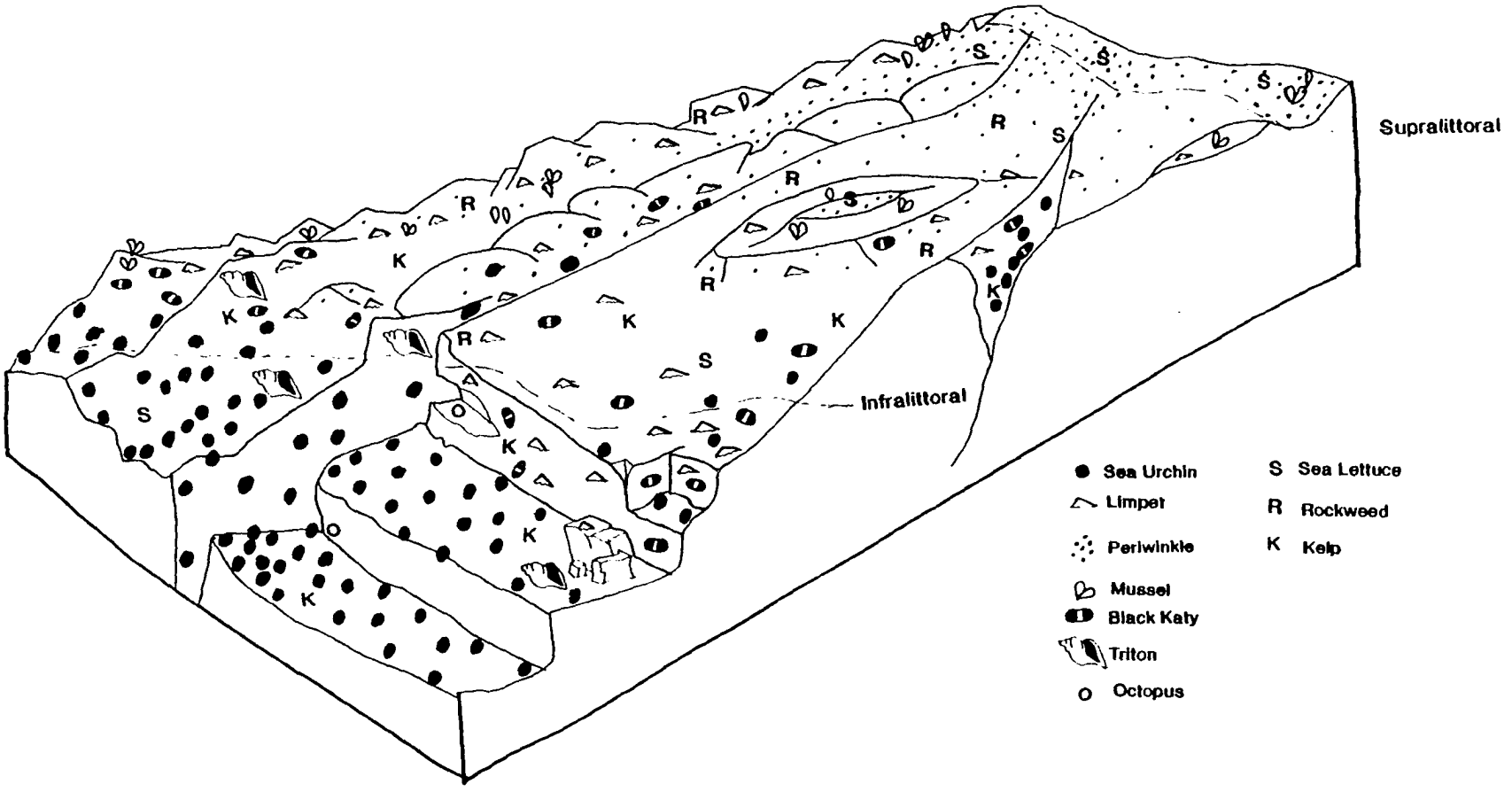

Figure 6 Reef Communities

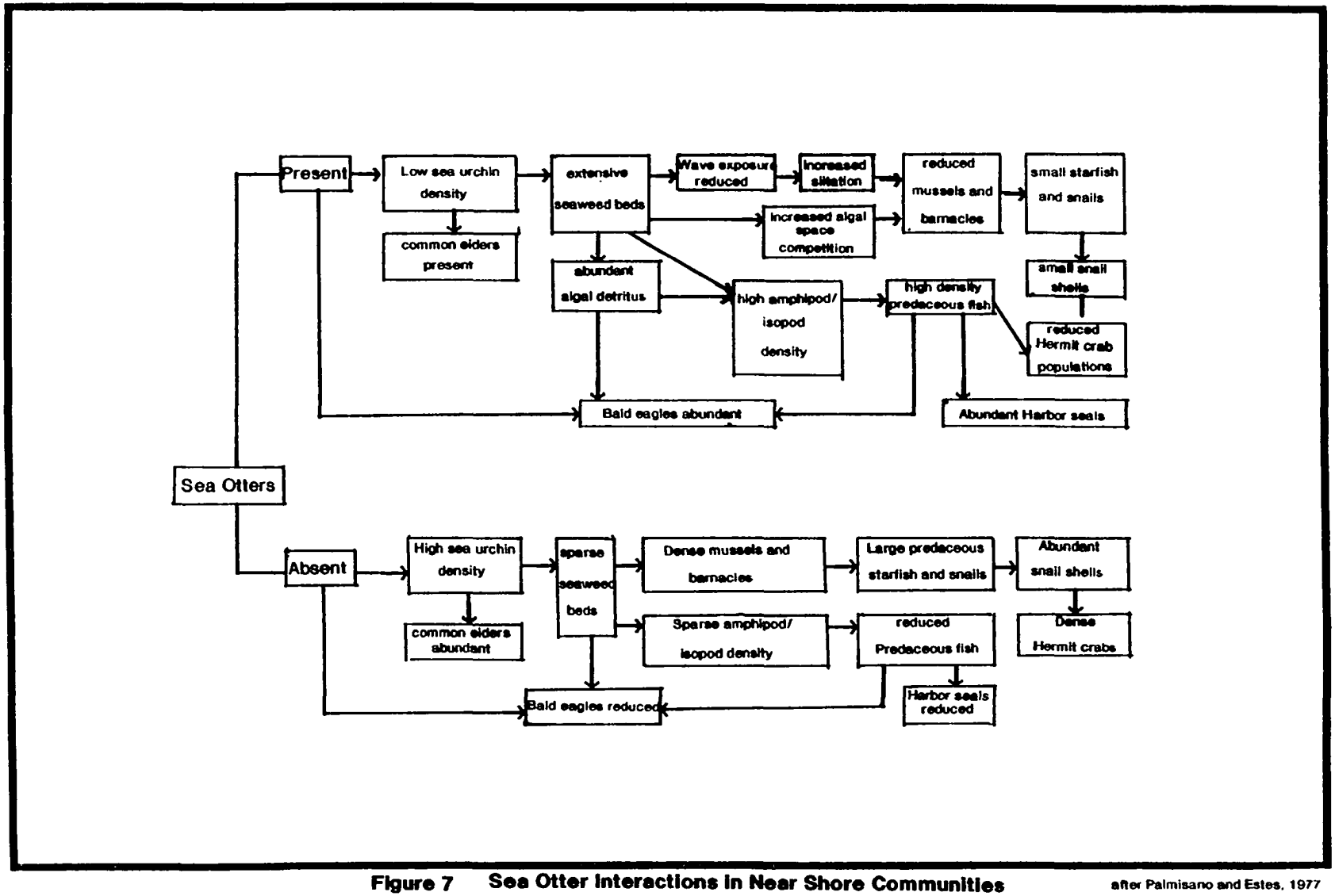

Figure 7 Sea Otter Interactions in Near Shore Communities after Palmisano and Estes, 1977

PREHISTORY

AMERICAN AND SOVIET INTERPRETATIONS

Positioned between North America and Asia, the Aleutian Islands have interested archaeologists on both continents. Most Soviet and American scholars now agree that the islands were settled from the east, an interpretation pioneered by Dall (1877), but beyond this there are few points of agreement. Indeed, Arutiunov and Sergeev (Black 1983) consider population movements from the west as well. Views about intercontinental contacts over the Aleutian Island corridor are particularly divergent.

A few American scholars accept the possibility of Aleut contact with Asia, DeLaguna (1940:73) considers the islands a "port" from which voyagers regularly travelled between continents. Desautels (1970) considered the possibility of at least one way contact with Asia in later periods of Aleut prehistory. Most American archaeologists reject the possibility and cite convergent development to explain similarities (McCartney 1974b; 1984:135). The dominant American view regards the Aleutians as a cul-de-sac or appendix. This view holds that after the ancestors of the Aleuts entered the chain they became isolated from most further influences, though some are admitted from the east, and their culture developed in isolation (McCartney 1984:135; Laughlin 1980).

Soviet scholars, viewing the Aleutians as an extension of Asia, believe the Aleuts maintained intercontinental contacts throughout their history. Similarities in cultures on the two continents are viewed as stemming from a common cultural base around 4000 BC, as well as continued contacts. Intensity of contact waxed and waned with a peak from about 500 BC to a few centuries AD and after 1000 AD, continuing to the historic period (L. Black 1983; 1984:14,27,40). This latter period coincides with a postulated population explosion in the Eastern Aleutians which resulted in rapid expansion to the west. Vasil'ievskii (L. Black 1983) believes the movement continued past the Near Islands to the Commanders and into Kamchatka where it split. One branch continued counterclockwise around the sea of Okhotsk to Sakhalin Island. The other moved south into the northern Kurile Islands.

The Commander Islands are key links in intercontinental contact arguments. Hrdlicka (1945) excavated in several sites on the islands and concluded all remains were historic. Unoccupied at the time of Russian contact, the presence of Stellar sea cows strengthens the argument the islands never had a resident population. No undisputed prehistoric sites are known but persistent reports of finds of Neolithic artifacts and the presence of depressions, presumably house pits, used as shelters by the Bering expedition survivors, suggest use of the islands in prehistory. Soviet scholars generally agree the islands were occupied, albeit with long interruptions, prior to the Russian discovery (L. Black 1983).

Especially close parallels between Aleut culture and the Southern Okhotsk Sea culture are postulated. This sea mammal hunting culture made a sudden appearance on southern Sakhalin island about 500 BC. The material inventory is characterized by poorly made stone tools, a well developed bone tool inventory, pottery, stone lamps, domestic dogs and pigs, and hexagonal houses with interior, stone lined fireplaces (Ohyi 1975). Origins of the culture are hotly debated but most Soviets see Okhotsk derived from Old Koriak and Old Kamchadal, roughly contemporaneous cultures of the northern Okhotsk Sea and Kamchatka. These are seen to correspond closely with Aleut culture, particularly in stone and bone tool technology. Old Koriak corresponds to Krugloi Point, Agattu and Chaluka level VI, and Old Kamchadal with Chaiuka levels III and IV (L. Black 1983).

Ohyi (1975) rejects the possibility of Aleut origin for Okhotsk. He believes Old Koriak and Okhotsk are indigenous traditions stimulated in similar ways by impulses from the Amur and Soviet Maritime regions. Both Old Koriak and Okhotsk influenced each other, and Okhotsk also received influences from Hokkaido. Plentiful skeletal remains have only added to the debate. Befu and Chard (1964) believed the Okhotsk people were Eskimo or Aleut, though later modified this to "Eskimoid" or Koriak-like Arctic Mongoloids (Chard 1974). Most Japanese and Soviet researchers consider the skeletal remains ciose or identical to Aleut remains (L. Black 1983).

Dumond (1987) sees the time between 2500-2000 BP as the "period of greatest similarity between the cultures of Eastern Siberia and Alaska". Undoubted culturai influences from Asia, including pottery, indicate renewed contacts across Bering Strait. He also sees parallels between the chipped stone technologies of the southern Okhotsk Sea culture, Norton tradition, Port Moller and the Eastern Aleutians.

THE ANANGULA AND ALEUTIAN TRADITIONS

The oldest known Aleutian site, the Anangula Blade Site, is located on Anangula Island near the southwest end of Umnak Island. The core and prismatic blade assemblage found here dates to 6000 BC. No faunal remains, human skeletal remains, or bone tools have been found at the site (McCartney 1984:122-123). Anangula is considered a variant of the widespread Paleo-Arctic tradition (Dumond 1987a; Powers 1973). Laughlin (1967) noted the remains could be lost in collections from Hokkaido dated between 13,000 and 9000 BP. The tradition is similar to the Mesolithic Sumnagin culture which originated on the middle Lena River about 10,800 +- 200 BC. The Siberian Sumnagin people were forest and tundra hunters, but many American blade sites are coastal and Anangulans almost certainly had a maritime adaptation (Mochanov 1978).

A hiatus of 3000 years separates the Anangula blade occupation from the Aleutian Tradition, which dates from about 3000 BC to AD 1800. Aleutian Tradition lithic technology is based on irregular cores and a bifacial reduction sequence. The bone industry is characterized by distinctive foreshafts, socket pieces, and often elaborately barbed harpoon and lance points. Sites are marked by deep midden accumulations made up largely of sea urchin, shellfish, and fish remains (McCartney 1984:124). Dumond (1987) suggests the earliest manifestations of the Aleutian tradition, at Idaliuk and Sandy Beach Bays on Umnak and at Islelo on Akun, are similar to the Ocean Bay tradition of Kodiak. This tradition was replaced, at least in the eastern islands, by the Norton-like tradition seen at Port Moller and in the lower levels of Chaluka.

Even leaving aside the issue of population movements from the west, the timing of the spread of the Aleutian Tradition through the chain is subject to some dispute. Traditionally, the process is seen as relatively slow. Dumond (1987:77), summarizing available information, puts the initial occupation in the Fox Islands around 3000 BC, spreading to the Rat Islands by 1000 BC and finally reaching the Near Islands around 600 BC. McCartney (1984:121) envisions a somewhat quicker process beginning in the east as early as 4000 BC. Westward movement was steady with the Near Islands inhabited by 2300-2500 BC. Work by Bureau of Indian Affairs archaeologists on Amchitka suggests the spread was rapid. Nine dates from four "blowout" sites[3] cluster between 2800 and 2350 BC, suggesting early occupation of Amchitka was roughly

3 A blowout is a deflated unvegetated area on bluff tops some distance from the sea, with stone tools and flaking debris but no organic artifacts. Carbon samples were collected from intact strata on the edges of the blowout depressions

contemporaneous with the eastern islands (US BiA n.d.). One sample from Shemya island yielded a date of 1590+-60 BC, nearly 1200 years younger than the Amchitka dates (Corbett 1990). Though one date is slender evidence for interpretation, the geographic gap between the Near and Rat Islands may have caused a pause in the Aleut westward expansion (Figure 8).

The earliest Aleutian tradition assemblages display an elaborate well developed sea hunting technology. Excavations at Chaluka indicate that for over 4000 years there was no replacement or abandonment of any major type of artifact to suggest fundamental changes in the way of life (Laughlin 1980:36). This assertion tends to obscure the changes which did occur. For instance, in the lowest levels of Chaluka (1700-1000 BC), houses with coursed stone walls, clay floors, interior fireplaces, and possible side entries were found (Denniston 1966). These are fundamentally different than later Aleut semisubterranean sod houses, which in turn were replaced by large communal dwellings. Hrdlicka (1945) noted houses of different styles on Agattu, including one with stone work and interior hearths, and one of whalebone. These changes in house style are not well dated. Cave burials on Kagamil Island, and house burials on the Alaska Peninsula also indicate changes in burial practices through time (Hrdlicka 1945; Bank 1954; Okada and Yamaguchi 1975). Again these changes are not dated.

On an artifactual level, stylistic changes are evident throughout the sequences. In the later prehistoric period one, or possibly two clusters of artifact types spread through the chain. The Late Aleutian Trait Horizon appeared about AD 1000 on Amchitka, though Laughlin dates it to "well within the last 1000 years" on Umnak. Characteristics include 1) iron knives[4], 2) ground slate, 3) mammal bone awls, 4) nipple ended needles, 5) symmetrically barbed harpoon heads with biconvex cross section, 6) conically tanged arrowheads, 7) conical socket pieces and new styles of decoration and hafting (Desautels 1970:349; Laughlin 1951:87). McCartney (1971) recognizes a late horizon which includes 8) long rod shaped socketed foreshafts with bifurcate tangs, 9) tubular socket pieces with bifurcate tangs, 10) rod-like unilaterally barbed projectile points, 11) small bilaterally barbed harpoons with wedge tangs to fit into the foreshafts, and 12) bear figurines. These artifact types appeared in the eastern Aleutians about AD 1600 to 1750. The rapid spread to the western islands indicates a period of accelerated inter-island contacts after AD 1600.

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4 The presence of iron indicates contacts outside the Aleutians.

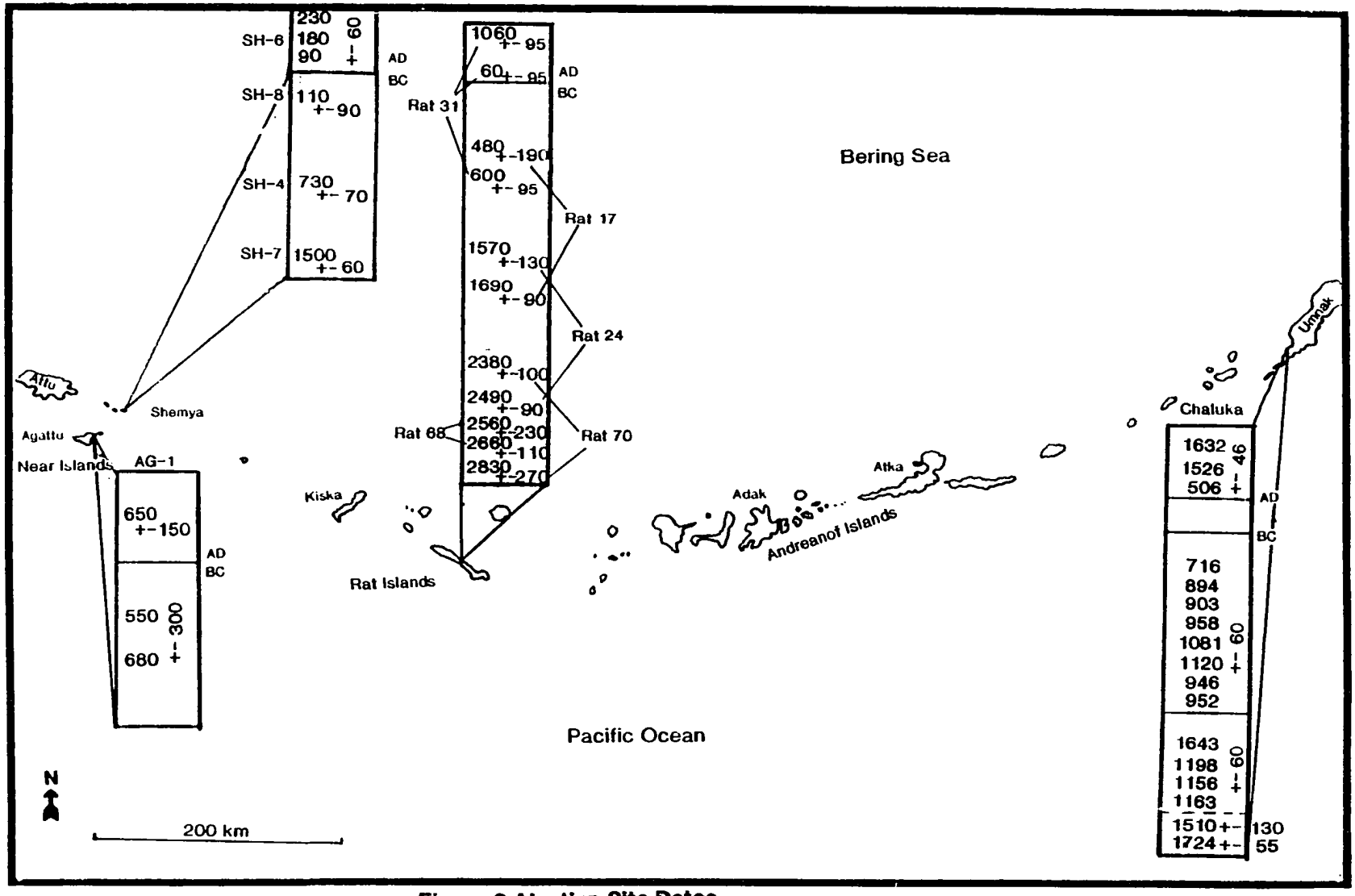

Figure 8 Aleutian Site Dates

The appearance of these new artifact types is accompanied by a biological dichotomy. Hrdlicka (1945) believed the long-headed Pre-Aleuts were replaced in the late prehistoric period by round headed Aleuts. Later researchers have accepted the dichotomy, but noting the continuity of the material culture, suggested the new form, Neo-Aleuts evolved from the older Paleo-Aleuts. The physical change may have been sparked by admixture with mainland people (Bank 1953; Laughlin 1980; Laughlin and Aigner 1975). The Neo-Aleuts originated in the eastern islands and had not come to dominate the western islands at the time of contact with the Russians (Hrdlicka 1945).

NEAR ISLAND SITES

In spite of the obvious importance of archeological research in the Near Islands for a complete understanding of Aleut prehistory, little excavation has been done. Dall (1877), Iokhel'son (Jochelson 1925), and Alan May (Hrdlicka 1945) all excavated on Attu and published some artifact drawings.

Hrdlicka (1945:287-309) excavated at three sites in Aga Cove on Agattu Island which he mistakenly calls McDonald Cove. He was primarily interested in human remains and recovered 31 skeletons and six isolated skulls in ten graves. Several skeletons lacked skulls and Hrdlicka remarked they were like some found on Kodiak. This may refer to dismembered human remains found in Kachemak culture contexts dated between AD 0 and 1000 (D.W. Clark 1984:137).

All three of the sites were abandoned before the arrival of the Russians. Hrdlicka noted the unusual lithic technology with "peculiar" flaking and tool styles such as chipped ulus and large points he interpreted as whaling lances. The predominant material was argillite which he felt influenced the technology. The bone industry was poor, with few tools and those of simple form. Lamps were simple hollowed cobbles. Hrdlicka recorded few architectural details but noted firepits outlined with upright stone slabs and a stone bench in one structure. A whalebone house was considered later than those of stone.

The only fully reported excavation is that of Spaulding (1962) at Krugloi Point, Agattu[5]. Excavation goals were to 1) provide dates for the first occupation, 2) obtain data on regional cultural variability, 3) determine the nature of temporal change, and 4) supply skeletal material.

5 As part of the University of Michigan expeditions directed by T.P. Bank II

Two carbon dates from near the bottom of Unit 4 returned dates of 2500+-300 and 2630+-300 or around 615 BC. This date was considered the best estimate of the first occupation of the site. A date of 1300+-150 BP for the upper levels suggest an occupation spanning 1300 years, with little change in artifact types through time.

Like Hrdlicka, he recovered few bone objects. While recognizing the role of material type on stone technology, Spaulding attributed the unique features of Near Island bone and lithic technology to a long period of development in total isolation.

Both Hrdlicka and Spaulding commented on the apparent paucity of bone tools in Near Island assemblages. Quantitative data are not available for Hrdlicka's work but Spaulding (1962) reports 289 bone artifacts from a total of 810 tools; 35.7% of the collection. Desautels (1970) reports 2822 bone tools in a collection from Amchitka, numbering 6862 artifacts, or 41% bone. Cook et al. (1972), also on Amchitka, collected 544 artifacts of which 31.6% or 172 were bone. Information from Chaluka is less clear but about 42% of the assemblage is bone (Aigner 1966; Denniston 1966). This admittedly small sample suggests the bone to stone tool ratio on Agattu is not significantly different from other Aleutian assemblages.

During World War II servicemen stationed in the Aleutians collected thousands of artifacts. Most of these remain unpublished. McCartney (1971) examined several collections from Attu, Agattu and Shemya. The artifacts were distinct enough from other Aleutian collections for McCartney to propose a Western Aleutian Phase. Distinguishing features include large barbless fishhooks, shouldered projectile points with contracting stems, and flaked semilunar knives. Stylistic devices include intensive circle and dot decoration on bone, and regular serrations and incising on stone points.

Since Spauldings excavation, most work in the Near Islands has been site surveys. Frohlich and Kopjansky (1975) surveyed the coast of Attu in 1975. The BIA conducted investigations on the Semichis and Agattu in 1988 and 1989. In 1990, Corbett (1990) tested a site on Shemya.

L. Black (1982) examining art from the Aleutians has noted the few objects known from the Near Islands reflect a distinctive Attuan culture. Ivory carving in particular is unusual; figurines with crude ovoid bodies and heads and pegged on appendages are similar to work by the Evenk of the Okhotsk Sea littoral and the Yenisei River. Painted circle and dot decorations were applied to some tools, especially harpoon heads, with a heavy hand. This use of the motif is confined to

the Near Islands (L. Black 1982; McCartney 1971). Grass weaving reached its highest level of development in the Near Islands, an achievement recognized by Aleuts further east. Finally, kamleika specimens collected in the early 1800s are of different style, in both shape and construction, than those of more easterly Aleuts (Varjola et al. 1990:168-171).

In 1989 I examined three collections from five sites on Shemya. Some stone artifacts were manufactured from materials available on Shemya but most formal tools are of argillite imported from Agattu Island (Corbett 1989). Cooper (1990) has noted the stone industry on Agattu is intimately adapted to the huge quantities of readily available material. The vast majority of tools are casually fashioned from coarse sedimentary rocks. The abundant material made these tools expendable, they were easily made and quickly discarded. Formal patterned tools, points and knives, of grey-black chert or a fine grained argillite are rare. The sheer quantity of flaking debris may explain the apparent paucity of bone tools on Agattu; when tools are compared the ratios are similar to other collections.

Published collections suggest many of the Late Aleutian Trait Horizon artifacts, including mammal bone awls, several styles of foreshaft and harpoon point, and most decorative motifs, are missing from the Near Islands. Interestingly, although Iokhel'son found nipple ended needles in the site excavated on Attu, the type in use at contact were eyed; the "new" nippled type did not replace the eyed variety in the Near Islands. Groundstone is rare and the knives have a different form than those further east.

ETHNOGRAPHY

At the time of Russian contact, Aleuts occupied most islands in the Aleutian archipelago. Though their adaptation to the environment was similar all along the chain, they were a far from homogenous people. At contact they were divided culturally, linguistically, and politically into numerous groups. The Near Islanders spoke a dialect of Western Aleut, now called Attuan. The now extinct Rat Islanders may have spoken a closely related dialect; almost nothing is known of this language (Bergsland and Dirks 1990). The other major division of Western Aleut, Atkan or Central Aleut, was also subdivided into at least two dialects (Bergsland 1957; Woodbury 1984). Though similar to their eastern neighbors, Attuan culture displayed differences in details of dress, food preparation, and hunting technology, as well as mythology, religion, and social organization (see L. Black 1984). Because this thesis focuses on the settlement patterns and economy of the Near Islanders, much of the cultural information available in early Russian sources is not included here.

Traditional Near Island Aleut culture was altered early and no single source adequately describes it. In 1840 Father Ivan Veniaminov (1984) published an ethnographic account of the Eastern Aleuts. He recognized regional differences and included a short section on the Atkans by Father Netsvetov. No ethnography has been written for the Attuan Aleuts, for any period of their history.

The history of the Aleutians may be broken into three periods: 1) earliest contact to the formation of the Russian America Company, 1745-1799, 2) Company administration 1799-1867 and 3) American control 1867-1942.

EARLY CONTACT, 1745-1799

Contact began with the arrival of the vessel Sv. Evdokim under Mikhail Nevodchikov, off Agattu in September, 1745. The crew was met on shore by 100 armed, but not overtly hostile, Aleuts and subsequently moved to less populated Attu Island. There, the Russians encountered between 30 and 35 men with dependents. While some of these men may have been in the group on Agattu, most probably had not as they were scattered in separate villages.

The men were from three settlements with from 5-15 men in each (Berkh 1974:16). Nevodchikov and his men stayed for a year, living apart from the Aleuts and hunting for themselves. They returned to Russia with 910 sea otters and delivered an additional 32 males, females and yearlings as tax (Divin 1979:document 3). After initial hostilities in which at least 17 Aleut men were killed, and a boy captured to become a translator, relations settled down and no further trouble was reported. However, as L. Black (1984) has pointed out the deaths of relatively few providers, leaving dependents destitute, are sufficient to effect a dramatic population decline.

If each man supported 4-5 dependents these villages on Attu each had between 20 and 75 inhabitants. Agattu had a population of at least 400 to 500, and Attu of at least 120-175. With no information available for the Semichi Islands, these estimates are minimums. Based on population density of 1.25 Aleuts per square kilometer of land area, Laughlin (1980:10) estimated the Near Islands could support 1000 people, an estimate supported by these early reports.

Between 1745 and 1799, 80 crews hunted in the Near Islands. The peak years, 1760-1763, saw 22 vessels in the islands. Most of these crews hunted on Attu. Only seven ships are reported off Agattu or the Semichis (Desson 1987:18-20). In 1750 Andreian Tolstykh brought arctic foxes to Attu; and by 1760 he introduced net hunting of sea otters (L. Black 1984). After 1780 ships stopped in the Near Islands for interpreters or left a hunting crew there, but most hunted further east. The earliest Russian reports describing the Near Islanders are by Prokopii Lisenkov in 1761 (L. Black 1984), Fedor Kul'kov in 1764 (Liapunova 1979) and Stepan Cherepanov in 1762 (Andreev 1948). Cherepanov and Kul'kov both state unequivocally the people of the Near Islands called themselves Aleuts; the Russians called those further east, Americans.

The Aleuts hunted sea lions, seals, and otters on offshore rocks. Birds, especially seabirds were plentiful and hunted in their rookeries. Puffins were taken with baleen snares. Whales, rarely seen, were eaten when found beached. Walrus, and especially sea cows, were also rare. Red and chum salmon were speared in the rivers. "Sea pike", Atka mackerel, halibut and cod were caught on hooks from boats. Shellfish were eaten when other food could not be found. Salmonberries, mountain ash berries, and crowberries were gathered on Agattu, and carrot- and parsnip-like roots were dug in the summer.

The Near Islanders did not store food and spurned Nevodchikovs gifts of dried fish (Berkh 1974). Meat was generally eaten raw but could be boiled or roasted. Kul'kov reported the people gained weight in the summer but winter frequently brought famine. Seining fish was soon adopted, and by 1764 the Aleuts were cooking seawater to extract salt and were, presumably, storing food. The Russians seined cod and hunted otters between March and November.

Men wore bird skin parkas, usually of cormorants, adding grass capes in cold weather. Women wore parkas of sea otter and sometimes of bird skin. Mens hats, of sea otter skins, are commonly listed in the early cargoes of the Russians. Grasses, sedges and reeds were woven into blankets, baskets, socks, and bags for cooking. Some people wore clothing of fish skins. Sea lion intestine kamleikas, and boots of flippers and esophagus membrane were worn in wet weather. Women wore labrets of white stone, and goose feather ear ornaments decorated with paint and tufts of fur. They colored their faces red. Men wore feather ear ornaments inserted differently than those of the women.

As the islands were treeless, driftwood, reported to be plentiful, was used for houses, boat frames, and tools, especially harpoon and spear shafts and knife handles. Cherepanov reported oak, beech, and aromatic cedar in small pieces, good only for burning. Spruce brought "in different ways" was larger. Spears, knives, and arrow points were all made of bone and stone. Iron knives, cold hammered from nails from shipwrecks, were prized possessions.

During the winter the Aleuts lived in small rectangular earthen houses, entered through the roof. Each man, with one to three wives, had his own house. Headmen had larger quarters and up to four wives. Community dances were held in these larger houses. During the summer people wandered, staying where they found food and taking shelter in rock clefts or in lean-to's during bad weather. They travelled freely between islands, the passage taking a day. Boys as young as 12 years old handled baidarkas (kayaks). At contact two hatch baidarkas were most commonly used, followed by the three hole variety. Single hatch kayaks were rarely used.

Lisenkov reported a Toion (leader or chief), Makuzhan, and second chief, Chintuyach on Attu. Other chiefs were Kalistakh, on Agattu and Alent on Shemya. Separate chiefs indicate each island (or major kin group) was politically autonomous. At contact the group residing on Agattu was politically dominant, and that island had the largest population. Tolstykh witnessed the succession of Makuzhans "best man," Bakutan, to the position of head chief and gave rich presents to the new chief and his leading men. Relatives of the new chief accompanied Tolstykh

to the east to act as interpreters (Divin 1979). By the late 1760s, Bakutan with his second, Chintuyach, was the only chief in the island group. The population had shifted to Attu to be near the Russians and their trade goods. In addition the Near Islanders, under military pressure from eastern neighbors, sought protection from raids. The population continued to decline; Kul'kov, in 1764, counted no more than 100 men and women.

COMPANY ADMINISTRATION, 1799-1867

In 1799 the government granted Grigorii Shelikhov's heirs a 20 year monopoly on the Pacific fur trade. The Russian American Company's Okhotsk office administered the central and western Aleutians, along with the Commanders and the Kuriles. This office flooded the Chinese market with fur seal furs, prices fell and, in the western Aleutians, hunting for profits declined. Russians and Aleuts turned to subsistence pursuits.

In 1805 Company Outpost Manager Solomein, with three baidaras of Central Aleuts (referred to as Atkans though most were from Adak or Amchitka), founded a settlement at the head of Chichagof Harbor. Company interest was still feeble and when Vasil'ev visited in 1812 no ship had called for four years (L. Black 1984:97,189).

The Attuans and their recent enemies, the Atkans, maintained separate communities. The Attuans were independent, hunting for themselves and trading with the Russians. Vasil'ev reported they could muster only 20 single hatch baidarkas, or 20 able bodied men. They were poor but lined their clothes with otter fur and used blankets of blue fox fur. According to Vasil'ev (Black 1984:161-162), birds were rare on Attu so the people wore parkas of fish skin. They traded fox and sea otter furs for guns and ammunition, and fiber to make nets. The Atkans were employees who hunted for a salary and were maintained by the Company. They stayed in the Company town in Chichagof Harbor and could muster 50 single hatch baidarkas. They were mainly employed in hunting sea otters. Both groups often wintered on Agattu, hunting sea mammals and birds there. In May they travelled to the Semichis for otters. They dried salmon and dug "carrot and parsley" roots to store for winter.

By the end of the 18th century Tikhon Golodoff became chief, replacing the Zaikov family in this role. The two factions occupied two settlements, one in Massacre Bay and the other at the mouth of Chichagof Harbor. Sometime after 1812 followers of the Zaikovs moved to Bering

island in the Commander group (Khlebnikov ms. 1827). Figure 8 shows Near Island settlements occupied at the time of contact and through the Russian period.

In 1827 Kyrill Khlebnikov made an inspection tour of Company holdings on Attu. He replaced Solomeins successor, Semeon Salamatov, with Ivan Duryshin. For the new manager he outlined the yearly round of activities to be followed. The information is probably most applicable to the Atkans in Company employ but the Attuans often accompanied those hunters. The schedule emphasized commercial hunting by men, but subsistence pursuits and women's contributions were not neglected.

Khlebnikov (ms. 1827) instructed the men to leave for the Semichis in October to hunt sea otters. At this time the animals could be netted, clubbed or shot on the rocks with guns[6]. The hunters would return to Attu in December to trap foxes until spring. About March, crews would return to the Semichis to harpoon sea otters from baidarkas. Otters were also hunted off Attu at this time. After May commercial hunting stopped and subsistence pursuits took over. Salmon were caught in weirs at Sarana Bay and processed by women for winter. Men made journeys along the north coast of Attu for driftwood, accompanied by women to fish on the reefs and gather grass and edible plants. Sea lions and seals were hunted where and whenever found. Agattu was particularly important for sea lions, and crews often wintered there hunting them and the abundant birds. Between 1842 and 1861, 2,421 sea otters and 2,503 blue foxes were exported from the Near Islands (Tikhmenev 1978).

Attuans accompanied the Atkans to the Semichis and Agattu to hunt, but were reluctant fox trappers. The settlement in Massacre Bay was also a summer fish camp but the residents travelled to Holtz Bay in August to catch cod. Though they had adopted some food storage techniques, drying and salting, food was scarce in spring and sometimes starvation threatened. Shellfish became staples when stored foods were gone and hunters could not find game.

Except for tea, sugar, molasses, and biscuits, the islanders --Russian, Atkan, and Attuan-- were self sufficient in food. In exchange for their furs, the Attuans wanted fabrics: wool worsted, linen, Chinese cotton and silk, velveteen, velvet, and taffeta. Desired clothing included vests, shirts, trousers, caps and hats, and silk shawls. Other necessities included rifles, shot and powder,

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6 After 1828 the Company forbade the use of firearms for hunting sea otters.

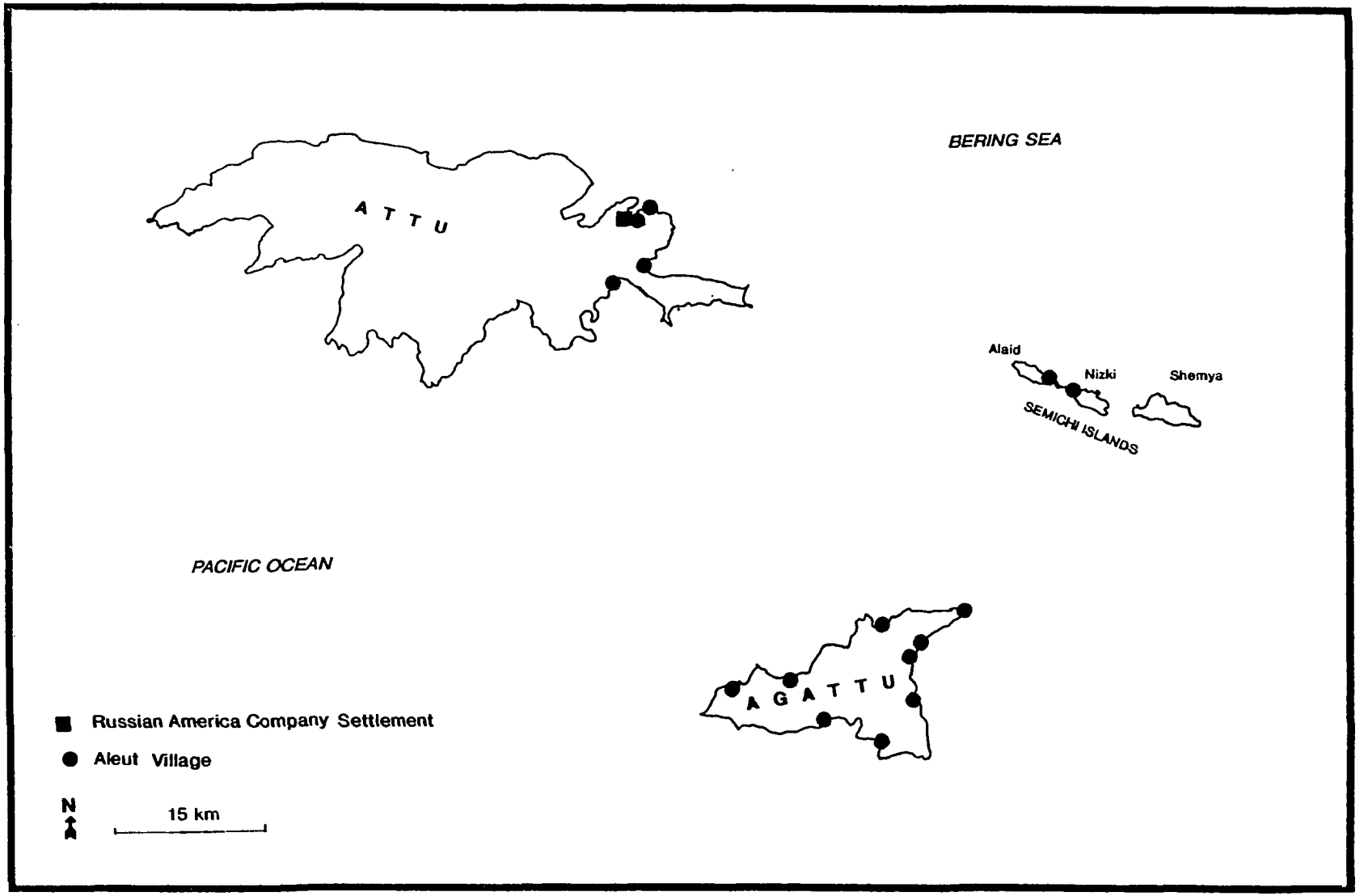

Figure 9 Russian Period Settlements, 1750– 1868

cooking vessels, copper tea kettles, casks, wooden beams and sawhorses, and needles and thread.

In 1848 Tebenkov (1981) reported only one village on Attu. This may indicate the Attuans had finally moved into the Company settlement. Twelve years later Tikhmenev (1978) reported a population of 248 including 21 Creoles[7].

THE AMERICAN PERIOD, 1867-1942

A decline in services in the remote western islands after the sale of Alaska to the United States contributed to a dramatic drop in the population of the Aleutians. In 1870 Charles Scammon (1870) reported 220 "souls" on "Atton" Island. Two years later, 38 Attuan men, some undoubtedly with families, under former Company manager Grigorii Terent'ev immigrated to the Commander Islands. Stejneger (1896) reported the population of the Commanders increased by 52 between 1870 and 1875. By 1880 the village ón Attu had 107 inhabitants, including one white and 32 Creoles (Petroff 1884). The Northern Commercial Company closed the store on Attu in 1889. The population in 1890 was 101 (Porter 1893). Though no longer guided by the Company the economy was still dependent on sea otter and fox furs.

In the first four years of American control more sea otters were killed than in the last 12 years of Russian management, 12,208. Between 1871 and 1891, 88,135 sea otter skins reached the market (Lensink 1966:15). In 1895 the Attuans killed two sea otters off Attu and they were then probably locally extinct (Lensink 1966:61). The legal end of sea otter hunting in 1911 stimulated more people to move to other islands. In 1913 the Aleutian Islands were made a wildlife refuge for the purpose of protecting bird populations and propogating reindeer and furbearers (Merritt 1977: 120,138).

The 1920s brought high fox prices and new prosperity to the islands. A.B. Sommerville assumed management of the store on Attu from William Dirks in 1911 (Swanson 1982:84). He leased the Semichi Islands and planted 15 blue foxes there (Gray 1938:134). Swanson (1982:81-82) reported overcropping of the animals on Attu about this time. In 1922 the Aleutian Fur Company

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7 Creole is usually considered a "racial" classification referring to the offspring of Europeans and Natives. In Russian-America the Creoles and their children comprised a social class, comparable in status to the townsmen of continental Russia

bought Sommerville out. The new owner, Fred Schroeder, planted new stock on Attu, and for the first time on Agattu, and built cabins on Shemya and Alaid (Golodoff 1988). Between 1922 and 1936, 1,074 foxes valued at $57,532 were taken from the Near Islands.

The Aleut trappers replaced many of their sod barabaras with frame houses (Gray 1938). A wooden church, built of materials purchased with money from baskets made by seven women was completed in the 1920s (Shapsnikoff and Hudson 1974). A school was built in 1932 but as of 1938 still had no teacher (Golodoff 1988; West 1938). The village boasted 44 Aleut inhabitants in 1940. In June 1942 Japanese troops invaded Attu, and in September, 42 Aleuts were taken to Hokkaido Japan. Two elders had died early in the occupation (Golodoff 1966; Kirtland and Coffin 1981:201-236). During the war the village was headquarters for the Japanese and was destroyed by American bombing (Garfield 1967:213-214). After the war, 24 Aleut survivors returned to the US. They were not permitted to return to their home on Attu and, instead, some were resettled on Atka.

SUBSISTENCE DURING THE AMERICAN PERIOD

Subsistence information for the American period is sketchy. Turner (1886) provides some details on when and how some plants and birds were used. Traders records and oral accounts from Attuan trappers are the only other sources of information for this section.

Most plant foods were gathered near the village but many had specific locations. Grass, cut in July and August, came from Kennon Island at the mouth of Chichagof Harbor. Roots, including sarana (Fritillaria kamschatkensis), lupine, and orchids were found on the west shore of Holtz Bay or on Gibson Island. The name Sarana Bay suggests those roots were also plentiful there. Most berries could be found on the slopes west of the village, but salmonberries and wild garlic came from Jim Fish Valley. Leaves and shoots were usually picked in May and June. Berries ripened in August and September and roots were dug from August to October (Wright 1988).

The main fish camp was in Sarana Bay but one family went to Holtz Bay (Wright 1988). People built a fish weir at the end of May for red salmon. Reds, available until the end of August, were joined by smaller numbers of chums and silvers from July to September. Pinks could be caught until November but were barely fit for human consumption after September. Occasional King salmon were caught at sea, usually in September (Turner 1886). Attu supports larger runs of

fish than do any of the Rat or Andreanof Islands; one of the reasons the Japanese chose mountainous Attu as a beachhead (Stewart 1981:116).

Cod populations fluctuate and although the early Russians caught them, Turner reported cod and Atka mackerel were newcomers to Attu. His informants had not seen them before 1875. Cod could be caught off the northwest coast of Attu, and were especially plentiful in February and March. Mackerel were found in huge numbers near the mouth of Chichagof Harbor and caught between April and June. Herring, abundant every three years, did not appear during Turners' stay. Greenlings were caught between August and October by women and children, while men gathered driftwood and fished offshore.

Birds were hunted any time, but people made a special effort to get Canada geese in September. Young geese might be captured and kept alive to eat during the winter (Turner 1886). The main sea lion hunt at Cape Wrangell took place in the spring, but the animals were taken whenever found. Seals, hunted any time, were usually found in Holtz Bay and along the coast east of Chichagof Harbor. Salmon, sea lions, and seals were dried, smoked, and salted for the winter. Barrels of salted fish were sometimes sold or traded to visiting Coast Guard ships (Dirks 1988, Wright 1988, Golodoff 1988).

Sales of fish and finely woven baskets provided some cash but the primary source of income was fox trapping. Trappers working Attu left home about October to restock and repair distant cabins. They began trapping in November, ending in March. They returned to the village in January for the holidays. The trappers maintained at least nine cabins around the coast of Attu, connected with each other and the village by a network of trails (Fig. 10). Men trapping on other islands were often accompanied by their families. They were moved to the island sometimes as early as August by a traders vessel. Attuans trapped on Agattu, the Semichis and in the Rat Islands on Rat Island proper. A small cabin sheltered trappers on Shemya. Two "barabaras" on Nizki and a cabin on Alaid were used for short stays on those islands. A more elaborate camp at Aga Cove, Agattu, with several cabins, formed the base of operations there. Like Attu, a network of trails connected temporary trapping cabins and barabaras to the main camp. Trappers on these outer islands could remain in camp until May before a vessel arrived to take them home. Though they took flour, tea, and a few other necessities, they relied on wild game and fish for meat and gathered shellfish and plants (Dirks 1988; Golodoff 1988; Prokopeuff 1988).

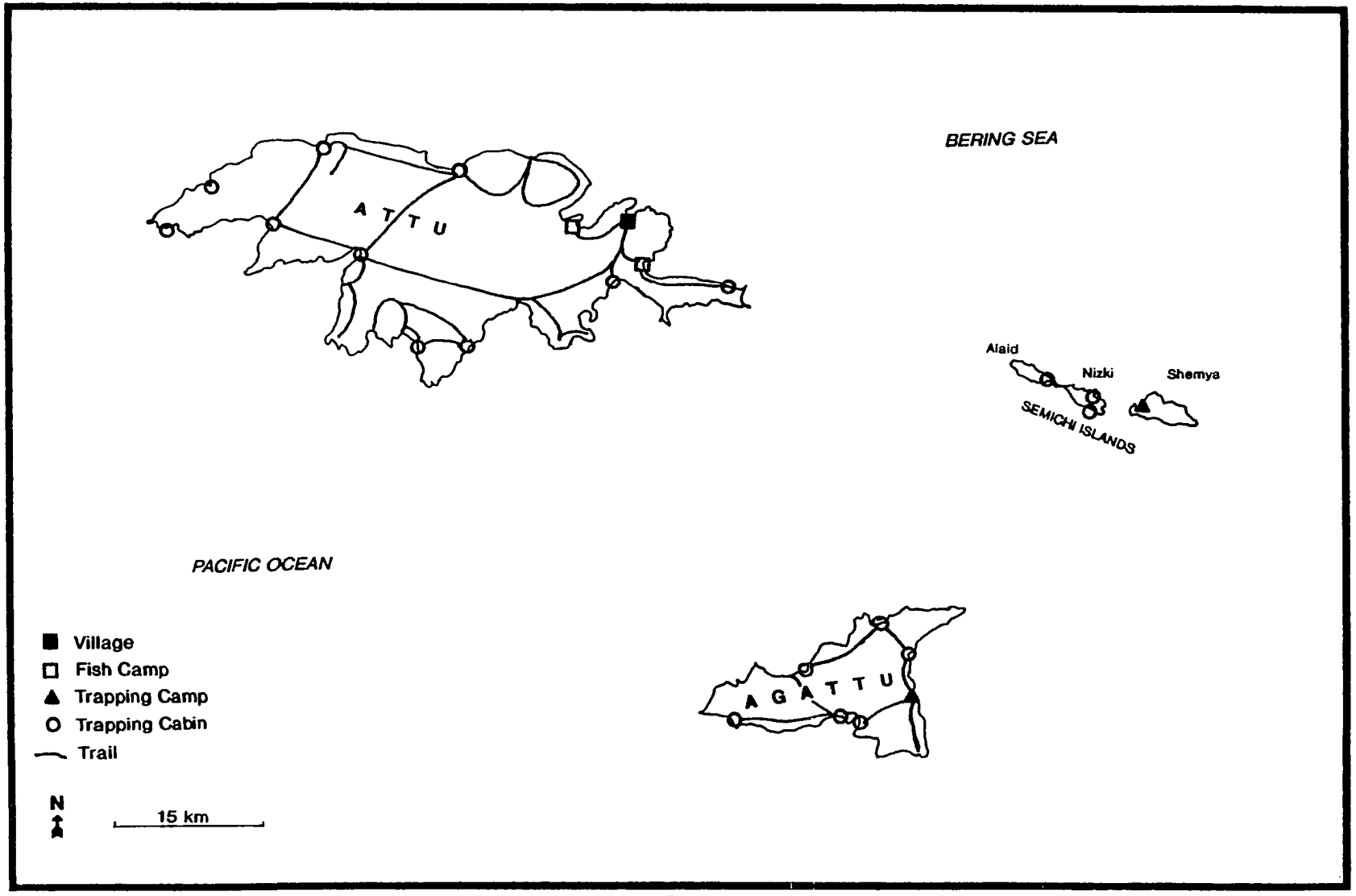

Figure 10 Twentieth Century Village, Camps and Trails

METHODS

One primary requirement of a settlement pattern study is a complete, or nearly complete, site inventory. No island group in the Aleutians, including the Near Islands, has been completely surveyed for sites. Thus my research has entailed a search of historic and archeological literature for site locations, and an analysis of aerial photography for additional site data. I was able to correlate many sites reported in the literature with the aerial photos.

Historical records describe a handful of sites, primarily on Attu. A specific concern with old or prehistoric sites did not appear until the late 1800s. Dall (1899) published a map showing 21 sites, two boat landings, and three portage trails on Agattu. He also reported three old sites on Attu, but provided no descriptions for any of them. Iokhel'son (Jochelson 1925) reported three sites, some storage caves, and two settlements in 1909-1910, on Attu; one cave in the Semichis, and one on Agattu. Hrdlicka (1945) reported on and excavated in, three sites on Agattu. His crew located two other sites, but no information on those is available.

The most complete survey until recently was made by Bank between 1948 and 1951. Using a combination of aerial reconnaissance and ground survey, Bank recorded four sites each on Shemya and Nizki, one on Alaid, six on Agattu and seven on Attu (field maps, 1948-1951). A summary of site locations prepared for the Fish and Wildlife Service by McCartney (1972), lists a total of nine sites and one cave in the Semichi Islands, nine sites and a cave on Agattu, and 14 sites on Attu.

In 1974 the Aleut Corporation sponsored a survey of Attu and Adak to help in preparing land claims as authorized under section 14(h)(1) of the Alaska Native Claims Settlement Act (ANCSA). This survey conducted by Frohlich and Kopjansky (1975) recorded 13 sites on Attu, five previously unrecorded[8].

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8 Section 14(h)(1) of ANCSA allowed Native corporations to select significant historical and cemetery sites which fell outside their regional and village land selections. The Aleut Corporation made over 300 claims in the Aleutian chain and along the Alaska Peninsula.

In 1988 the Bureau of Indian Affairs (BIA) began investigating the Aleut Corporations 14(h)1 claims in the Near Islands. The historic village in Chichagof Harbor and one site and a trapping camp on Shemya were mapped and described. An aerial survey of the coast of Attu tentatively added nine additional sites to that islands' inventory. Three other sites reported for Shemya were not located and were believed destroyed by military construction (US BIA 1988; 1989). In 1989 a BIA crew on Agattu investigated 10 known sites there. The crew also conducted boat and foot surveys of the entire coast and recorded an additional 21 sites (US BIA 1991; 1990). A second crew on Alaid and Nizki recorded the five sites reported for those islands. Additional portions of these islands were surveyed and seven sites; two on Alaid, five on Nizki were reported (US BIA 1991a, 1990).

I travelled to Shemya in 1990 to conduct test excavations of the one site remaining on that island. With aerial photographs and help from island contract construction workers, four additional sites were located. Two other sites, one visible in the photographs, are believed destroyed by military construction (Corbett 1990).

Although far from complete, this survey information is a good beginning for a settlement pattern study. Bank (1953a:262-263) commented on the feasibility of using aerial reconnaissance to locate midden sites. The success of using aerial photos to find damaged sites on Shemya indicated more complete coverage might fill in gaps on the other islands, particularly Attu. The most extensive coverage of the islands were black and white Army photographs dating from 1948 and 1951[9]. Of somewhat better quality, but with less extensive coverage, were Coast and Geodetic Survey photos taken in 1948.

Coverage of Attu is as complete as possible. However, portions of Etienne and Abraham Bays, the western half of Nevidiskov Bay, and the northeastern quarter, from Holtz Bay to Hodikoff Point north of Sarana Bay, are unavailable. Records indicate these areas were never photographed, but the Holtz Bay/Chichagof Harbor area may still be militarily classified.

Complete coverage of the Semichi Islands was obtained for two reasons. One was to provide as much information on the sites and original condition of Shemya Island, now heavily altered by

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9 It had been so long since any of these photos had been ordered the computers did not recognise the catalog codes

military activity. The second was to compare information from the photos with the field survey and verify the possible sites reported in the BIA survey. Coverage of Agattu was restricted to sites located, but not described, by BIA in 1989. Approximately half of the coastline of Agattu is covered by the photos ordered.

Most photos are stereo pairs; when viewed through a stereoscope the juxtaposition of two photos creates a three dimensional effect. Clouds hover over the islands, and cliffs and mountains leap into sharp relief. The topographic situation of the sites is clearer in the stereo photos than any single picture could show.

Relying solely on aerial photography, with no on-ground survey, poses a chronology problem. Only seven of the 107 recorded sites have any radiocarbon dates available, and only one has more than three dates recorded. Historic period sites can be distinguished using other criteria, but all prehistoric sites by necessity form a single category.

Relevant criteria for recording site information have been broken into several categories 1) size, 2) geographical setting, 3) availability of resources and 4) other, including climate and oceanography, and cultural factors such as defense. Aerial photography was most useful in determining site location and size and clarifying some geographic and resource variables.

Using navigation charts, a scale for each of the photographs was calculated using a comparator with a gridded lens. The number of squares occupied by a site was entered onto a spreadsheet with the photo scale, and site areas, in square meters and acres, were calculated and tabulated. Sites measured in both the aerials and during ground survey were compared to identify any measuring biases. Most biases were due to problems with visibility on the photos, and usually resulted in inflated estimates of site size. In cases of large discrepancies I returned to the photo and redefined the site. This process helped refine definitions and curb more imaginative identifications. Wherever possible I used size figures derived from aerial photographs, after I had refined the measuring technique. For 15 sites without aerial coverage I used the measurements obtained during actual survey.

Geographical determinants were patterned after McCartney (1977). Elevation, measured from the approximate center of each site, is only approximate, as the topographic maps lacked the resolution for closer determinations. Exposure includes not only the island shore, but the configuration of that shore, whether in a bay, on a headland or on open coast, and aspect, the

direction a site faces relative to the sea. Calculation of slope angle was not feasible from the maps and photos, but the local topographic setting of each site, as well as major features of the marine environment were impressionistically recorded.

Quantification of resources presents a problem. Such quantification depends on estimates of hunter mobility. Available ethnographic information suggests fox trappers could cover up to 16 km a day on foot. This is apparently the maximum distance a person in the Aleutians could travel in one day on foot. Historically hunters in baidarkas regularly traveled the 70 km length of Attu in one to two days (Prokopeuff 1988; Golodoff 1988; Wright 1988). These distances effectively place all of an island within reach of a single site on that island. To address this problem, information from excavated sites was used to determine resources used. Then the closest source for each resource listed was located, thus defining a minimum catchment for each site. With this information as a base, the potential catchments of the other sites could be estimated.

Distributions of sites were analyzed with regard to specific resources. One excavated site had information on lithic materials. Geological information on rock distributions coupled with this data added additional information on potential site catchment. Other resources used in analysis included fresh water, salmon streams, bird and sea mammal rookeries, reefs and offshore fishery potential. Resources were considered to be immediately adjacent to a site if they were within 1000 m.

Other variables include winds, currents, tides, surf conditions and warfare, these are much harder to quantify. These variables, taken in conjunction with the others already listed may provide additional clues for determining site function.

SITE DESCRIPTIONS AND DATA ANALYSIS

SITE DESCRIPTIONS

Many aspects of site description are covered under setting, geography, or resources. A variety of site types is reported from the Near Islands, although most are poorly known. The overwhelming majority are middens, mounds of shell and bone debris, composed primarily of sea urchin, and distinguishable from a distance by a rank growth of beach rye grass and large leafed umbellifers. Surfaces are usually dotted with depressions of various sizes and clarity, representing the remains of semisubterranean houses and other structures of different ages. Features are usually tightly clustered on the midden but in some cases extend beyond the edges of the mound. Several middens have historic components, inferred from documents or features such as multichambered and bermed above ground structures, or structures with entryways through the walls. Very large features may represent prehistoric communal dwellings, or barracks built after the arrival of the Russians to house hunting parties.

Lacking the chronological control fundamental to settlement pattern studies, all prehistoric sites have to be treated together for analysis. Nearly 3,000 years of occupation are documented for the island group, and sites were often occupied for long, more or less continuous periods. Of course not all the sites are contemporaneous. Most were probably only occupied for part of the 3000 years. Older sites, lacking the distinctive midden vegetation readily visible in aerial photographs, may not be represented in the sample at all.

Twentieth century trapping camps and cabins comprise the second major type of site. Information on these comes from Gray (1938) or Attuan trappers (Golodoff 1988; Wright 1988), as well as recent surveys. Abandoned now for over 50 years, the remains of small frame cabins or grass covered "barabaras" are found in many bays and coves on all islands. Most are single structures for temporary stays, but more permanent camps were built at Aga Cove, Agattu and in Alcan Harbor, Shemya. These had one or more wood frame cabins to house trappers and their families for many months. Some of these camps are marked by Russian Orthodox crosses on graves of people who died on the trapping islands.

More poorly known site types include caves and rock cairns. At least eight caves are reported from Attu (Bergsland and Dirks 1990), with one each on Agattu, and Alaid. Available evidence suggests they were temporary or summer shelters, and storage areas; no cave burials are known in the Rat or Near Islands. Reports of paintings or masks in some caves may hint at ritual uses (Jochelson 1925:122). Cairns (low piles of rocks) were found near small lakes on the northeast end of Agattu in 1989 (US BIA 1990). Very little is known about this type of feature; they may date from World War II and not be Aleut at all.

A total of 106 sites are presented here (Figures 11, 12, 13). Of these, 91 are middens, including 15 with historic components. Sixteen of 22 trapping camps and cabins are also located on or near prehistoric and historic middens. Other sites include the historic village in Chichagof Harbor, founded in 1805 and abandoned in 1942, two historic fish camps on Attu, and some nonmidden sites with house depressions (Table 8). Most of these are small, consisting of two or three features with no accompanying mound of debris. A few on beach ridges are quite large.

Table 8 - Site Types and Numbers by Island

Site type	Attu	Agattu	Alaid	Nizki	Shemya
Midden	39	31	7	5	9
paired	1	2	2	-	1
historic	4	9	1	1	?
trapping	9	5	1	-	1
Nonmidden	5	1	-	-	-
prehistoric	4	-	-	-	-
historic	1	1	-	-	-
Historic-Village	1	-	-	-	-
Fish Camp	2	-	-	-	-
Trapping	2	2	-	2	-

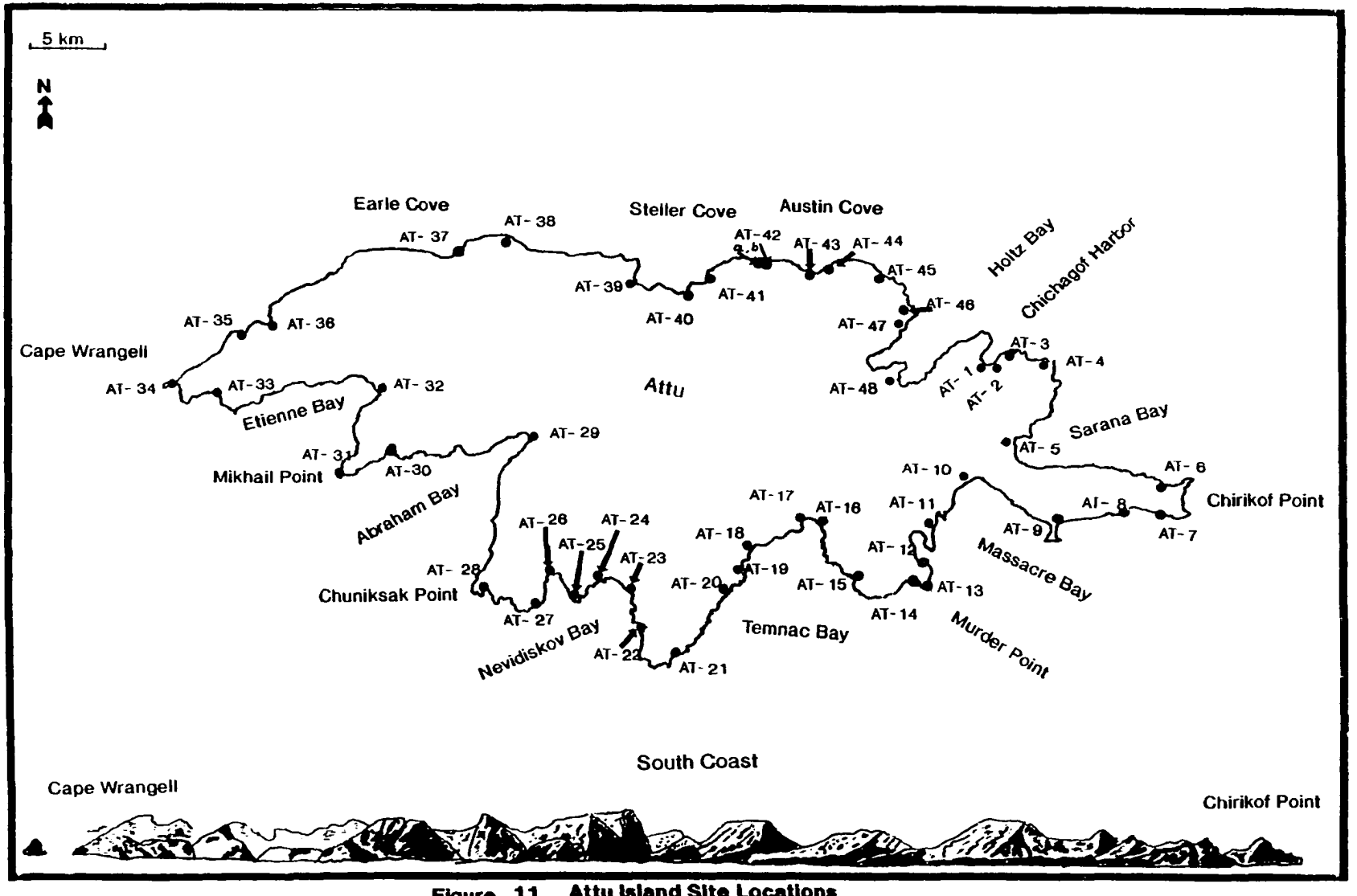

Figure 11 Attu Island Site Locations

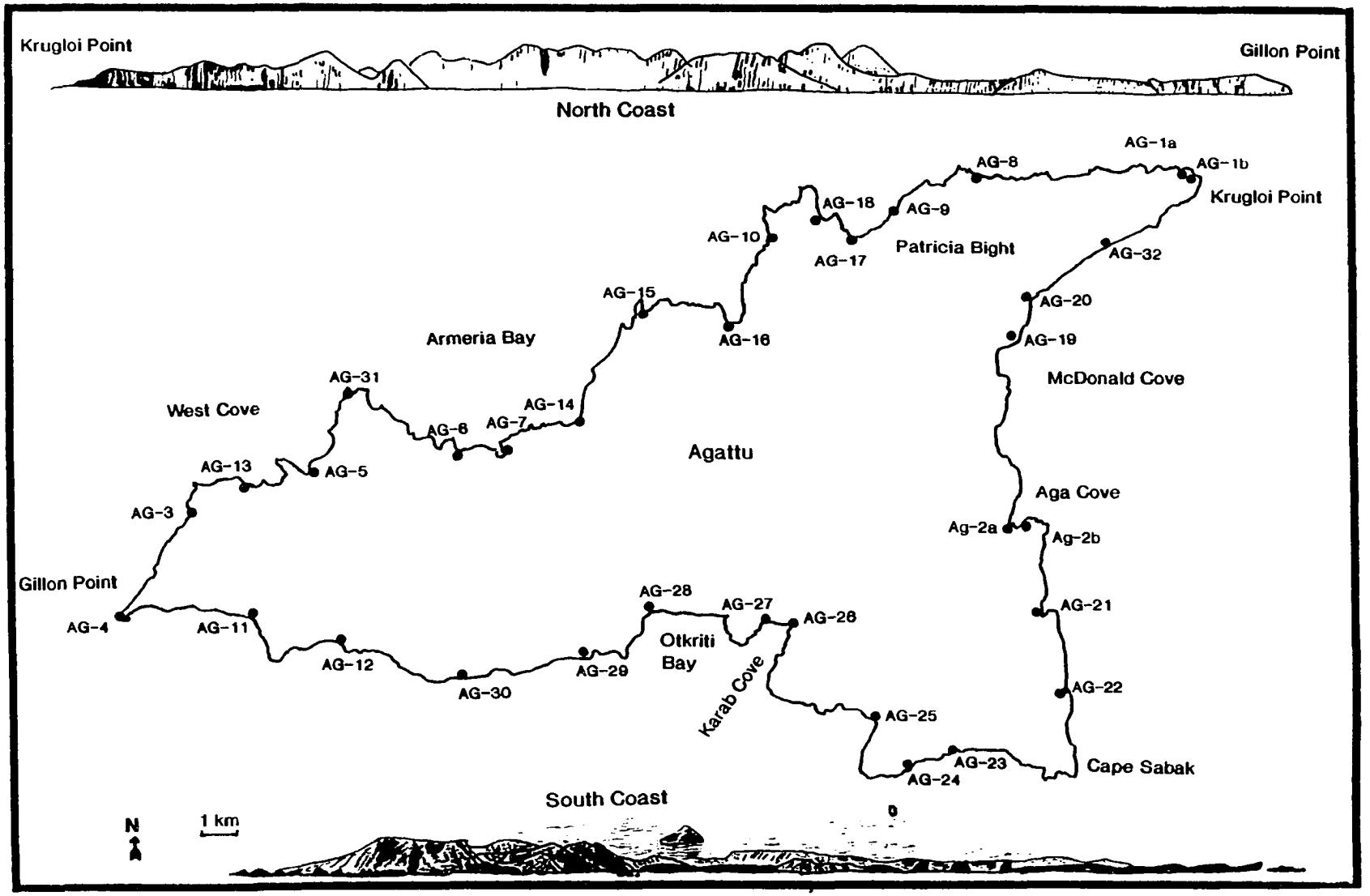

Figure 12 Agattu Island Site Location

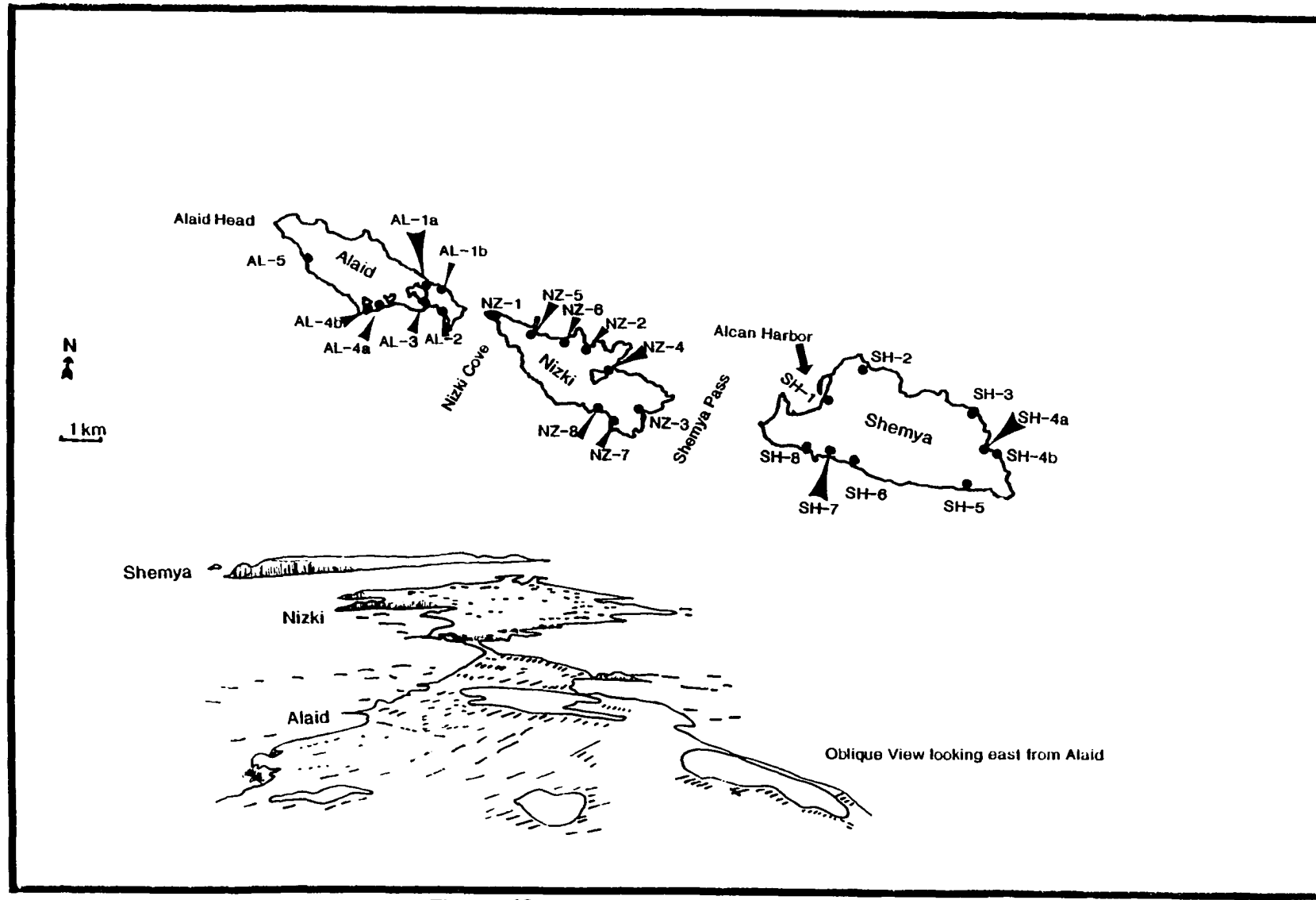

Figure 13 Semichi Island Site Locations

Several sites appear somewhat anomalous. NZ-3 is a large midden with only one feature recorded. Survey data suggest it is an older site, long abandoned, with an historic reoccupation. AT-35, a small midden, is associated with the mythical Attuan woman who is said to have founded the Attuan population encountered by the Russians, after the decimation of the islands by eastern raiders (Khlebnikov 1827 ms; Bergsland 1956). In addition there are six paired sites or high/low sites; separate middens in close proximity to each other. Hrdlicka (1945) and Spaulding (1962) both noted that the sites they located and excavated on Agattu consisted of two middens in close proximity to each other. Desautels (1970) described such paired sites as a distinctive type on Amchitka. The reasons for the unusual occurrence of two sites next to each other are unclear. Two explanations are suggested, 1) differences in season of occupation, or 2) age (Yesner 1977; Desautels 1970; Miraglia 1986, McCartney 1984). If contemporaneous occupation can be demonstrated each portion of the sites may have been used by different social units or kin groups.

Determination of size and number of features on any site is difficult at best on the ground, and nearly impossible to derive from aerial photography. However, large features are visible in a few of the photos. Some of the large pits may represent chiefs' houses, which were also used for ceremonies and community gathering places. In Figure 14 these large features have been used as indicators of possible winter, or permanent, residences.

BURIAL DATA

In archeology, burials provide the most direct picture of world view and ideology. Aleuts throughout the archipelago practiced a bewildering variety of burial techniques including cave burial and mummification, extended and flexed burial in rooms off large communal houses, burials in abandoned or specially constructed burial houses, in above ground sarcophagi, and in umqans[10]. No mummy burials are known west of the Islands of the Four Mountains and cave burials, umqans and sarcophagi are unknown west of the Andreanofs (US BIA nda).

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10 An umqan is a root storage celler but the term has been applied to a specific type of burial. They are characterized by low mounds covering a chamber outlined in stone or whale bone. A U- or V-shaped trench opening downslope encloses the mound. Umqans usually contain a single burial

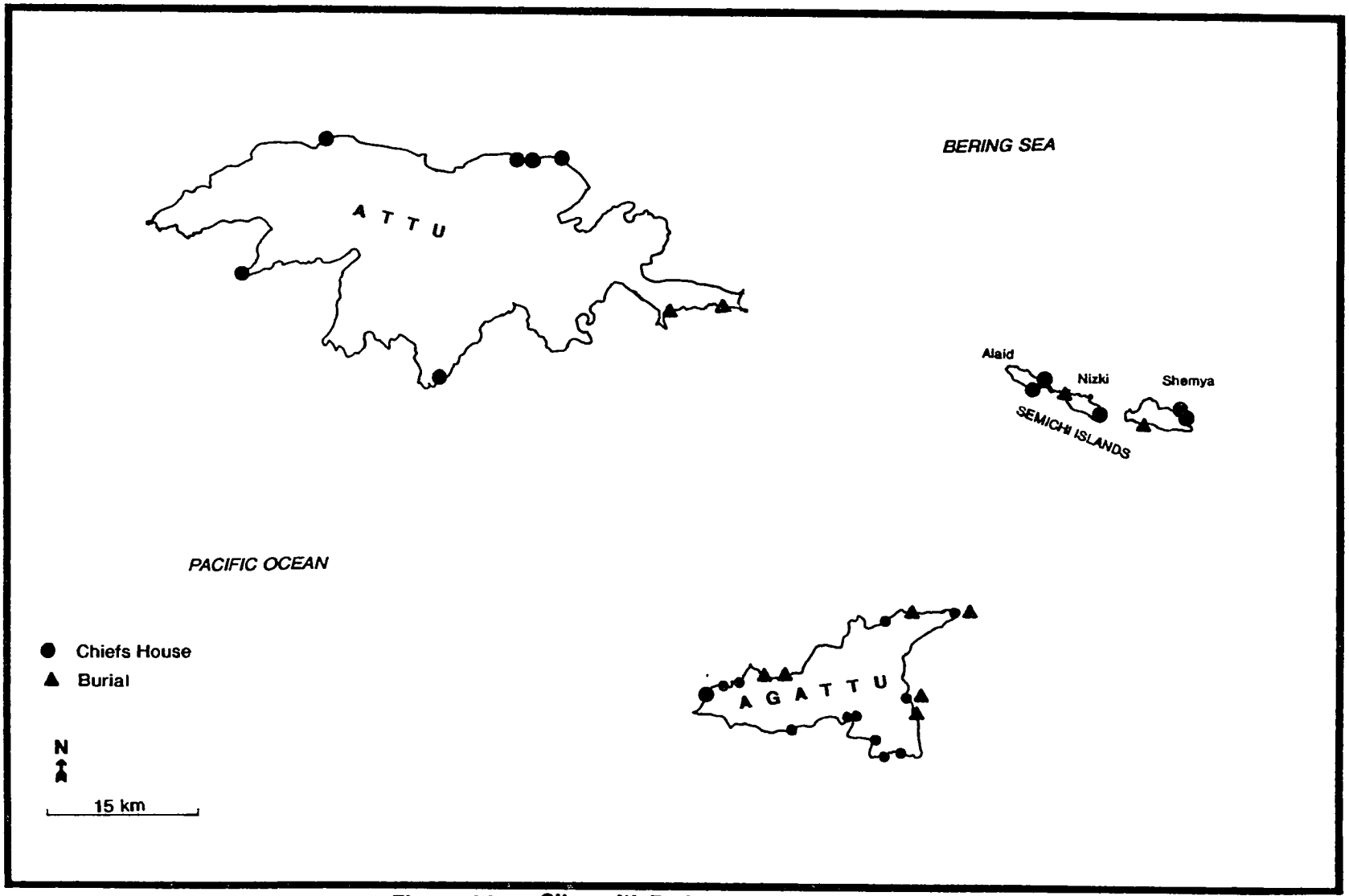

Figure 14 Sites with Burials and "Chiefs Houses"

Nevertheless, the meager information available indicates that, while less spectacular than eastern mummies Near Island burial practices were complex.

On Attu, Iokhel'son (Jochelson 1925) found burials, covered with whale bone, in small pits adjacent to prehistoric houses. He found one skeleton in one pit and eight others in the second. The individuals were interred separately, over a period of years. The mixed condition of the bones suggested to Iokhel'son a lack of concern with placement, but their condition could be the result of bundled burials tipping over as the burial structure decayed. Hrdlicka's (1945) Agattu report lacks contextual information, but his data suggest burials of two or more individuals, of mixed sex and all ages, was typical. He recovered 31 skeletons and 6 isolated skulls, in 10 burials. One contained a woman and six children. Three of the burials were surrounded by, or covered with whale bone. Skeletons without skulls and isolated skulls were common; individuals of any age or sex were subject to decapitation.

Spaulding (1962) also found mass graves on Agattu, primarily of women and children. When the jumbled condition of the bones permitted analysis of the burial position, the bodies had been flexed. The skull of one adult was missing. Two adult males had been buried individually in extended positions. The top of the skull of one of these men had been removed prior to burial. In addition, two infant skeletons were found. In 1968 Robert Jones of the US Fish and Wildlife Service excavated an eroding burial on Agattu. Three adults and one child had been buried together, probably in a pit, and were covered with a whale scapula.

Recent surveys in the Near Islands have added little to understanding Near Island burial practices, though human remains are noted when found (Figure 14). The apparent lack of burial descriptions on Attu merely reflects the dearth of survey data for that island. Most large middens probably contain burials. Data on chronology, a critical element for any detailed analysis, are also lacking for all burials from the Near Islands.

The available data suggest bodies were placed in structures, possibly abandoned houses or specially constructed burial houses. Some were solitary, while others, possibly related individuals, were buried in groups, suggesting the huts were opened and reused as necessary. Differences in treatment of the dead ex Differences in treatment of the dead existed treated separately. A large proportion of located burials were associated with whale bone. Individuals buried together in structures may have been flexed or bundled, while the isolated

burials, usually male, were extended. Without additional excavation, and reanalysis of the existing remains, little can be said about the meanings of these cultural patterns.

SITE SIZE

Size calculations were made for all middens for which measurements are available (91 of 106 sites, appendix 1). The two middens of a paired site were measured as separate sites. Area measurements were not available for 12 middens, including eight on Attu. The primary reason was a lack of photo coverage, but military activity on Attu and Shemya has obliterated five known midden sites on those islands. The historic village, two fish camps and any trapping cabin not on a midden were not included in size calculations.

Site sizes range between 350 and 18,700 square meters. The average size of sites on Attu, 5,470 m^2, and the Semichis, 5,280 m^2, is nearly the same, while sites on Agattu average 3,290 m^2. The reasons for the size difference can be found in the geography of the islands. Larger sites are located in areas with flatter, more open topography and Agattu lacks extensive areas of flat ground. Sites there are compressed into the smaller spaces available.

Near Island sites were divided into five size classes 1) 0-2,500 m_2, 2) 2,501-5,500 m_2, 3) 5,501-8,000 m_2, 4) 8,001-12,500 m_2, 5) 16,500-19,000 m_2 (Figure 15). The distribution presents no surprises, the majority of sites are small with just a few at the large end of the scale. Agattu has relatively more small sites and the Semichis slightly more large ones.

For each island the number of sites in each size class was divided into coast length (Table 9). Though the sites are not evenly distributed the coast length ratios for the smaller three classes for Agattu and the Semichis show a close correspondence. The distributions suggest these islands were richer in resources than Attu, an observation made above (page 15).

Distributions of the larger sites are interesting. The generally smaller size of Agattu sites notwithstanding, each island had at least one site considerably larger than any other on that island; Attu has two such large sites in proximity to each other. On Attu and Agattu, the largest sites are on the east or southeast coasts, oriented to the east. On the Semichis, the largest site is near the center of the group, oriented to the north (Figure 16). At least one midden in each of the six site pairs belongs to the largest, or second largest, size category. If the pairs are combined into one site they rank in the largest category.

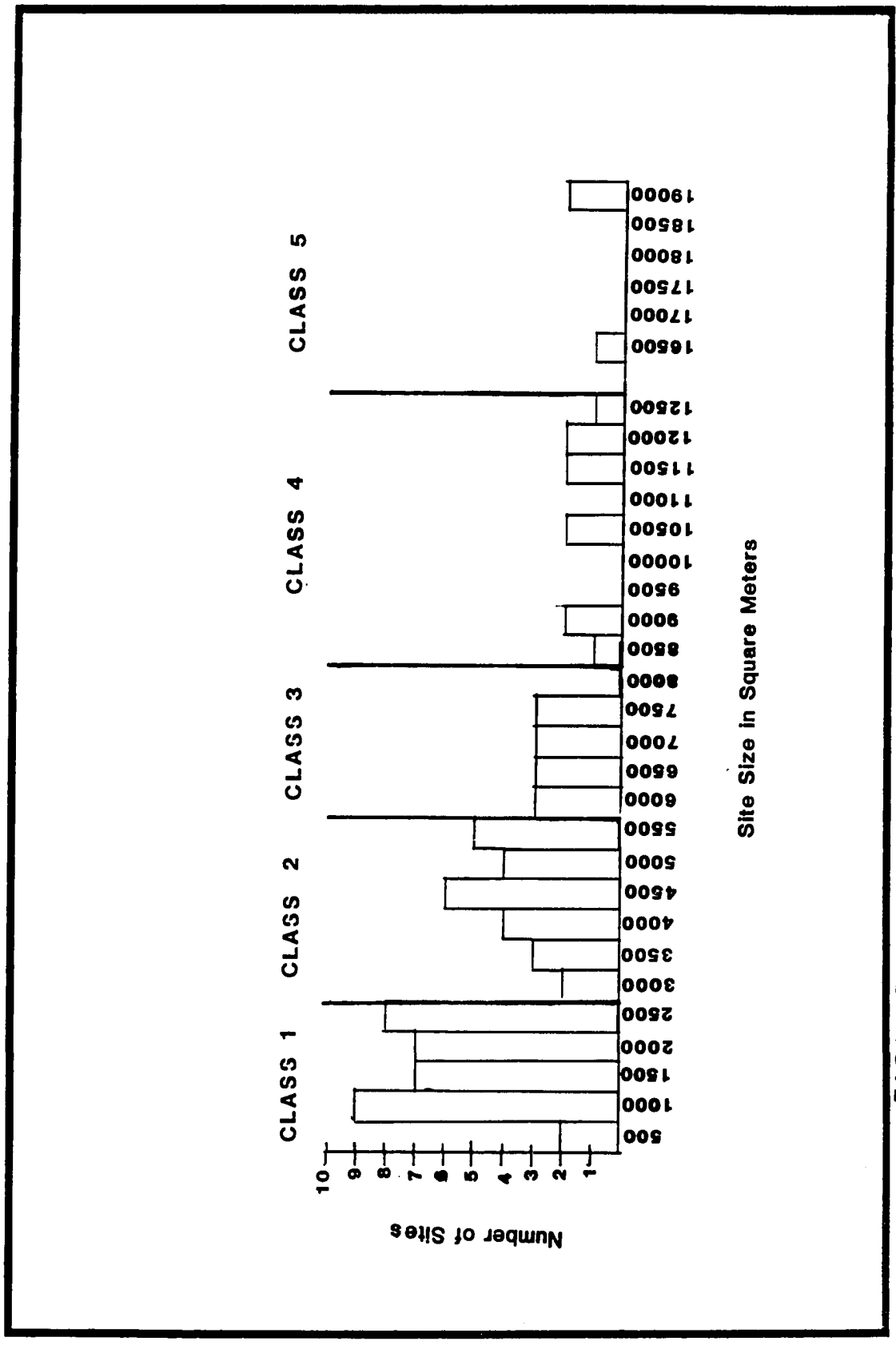

FIGURE 15 GRAPH OF SITE SIZE DISTIBUTIONS

Sites in the next largest size category are fairly evenly distributed around the island shores, although on each island there are two of these sites close together. Temporal differences between the sites may make the juxtaposition more apparent than real. The three smaller size classes show no discernible patterning in relation to island coastline or to other sites.

The site size data suggest several possibilities. Population density on Agattu and the Semichis appears to have been approximately the same, while Attu was perhaps only 1/3 to 1/2 as densely populated. Size data alone cannot suggest function but distributions suggest the largest site on each island represents a permanent winter settlement. The smallest sizes could represent temporary camps and resource procurement stations. Larger sites could be summer or satellite villages, or subsidiary winter settlements. Determining site function requires the analysis of many variables but size and distribution data already suggest the picture is more complex than previously recognized.

Table 9 - Ratios of Site Size to Coast Length

Size Class	Attu no. sites	Attu coast length	Agattu no. sites	Agattu coast length	Semichis no. sites	Semichis coast length
1	11	22.3	15	7.8	7	8.2
2	11	22.3	10	11.8	5	11.5
3	7	35.0	5	23.5	2	28.8
4	5	49.0	1	117.5	3	19.2
5	2	122.0	0	0	1	57.7

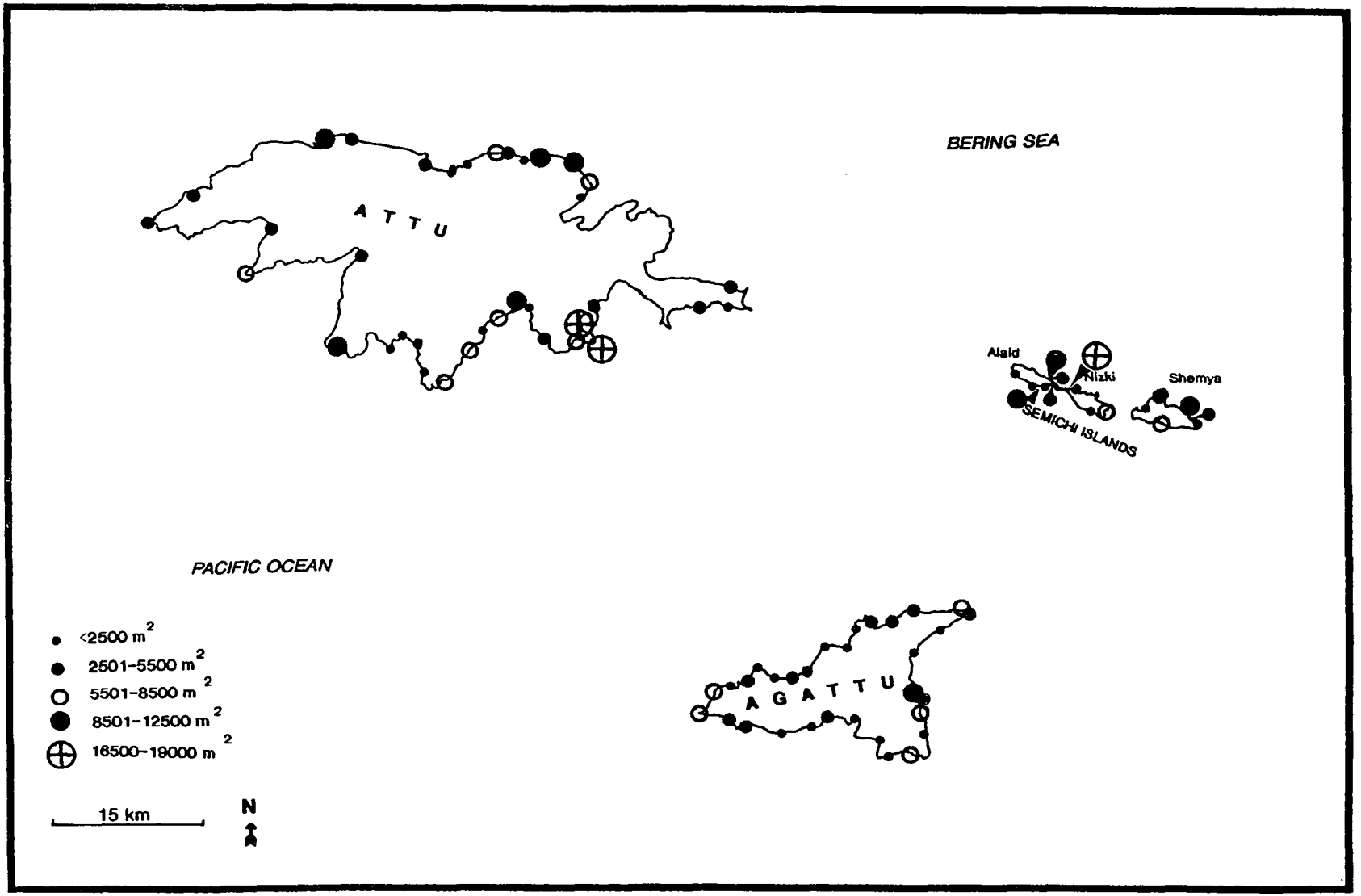

Figure 16 Distribution of Sites by Size

GEOGRAPHY

Most researchers concerned with Aleut settlement patterns have focused on geographical influences. Veniaminov reported most village sites in the eastern Aleutians were on the north (Bering Sea) coast of islands. McCartney considers elevation to be critical. Protection, including site exposure and boat landings, and flat land are also important factors.

Site distributions suggest the number of sites on a coast are directly proportional to the length of the coast. The north and south coasts of the Near Islands are considerably longer than the east and west coasts. Consequently these shores host the majority of the sites. When size is considered, four of the seven largest sites on Attu are found on the south coast. On Agattu two large sites are located on the east coast and two on the west, with one each on the north and south. Only in the Semichis are the largest sites (three of four) concentrated on the north shore.

Virtually all of the sites (83%) occur at elevations of less than eight meters above sea level (asl). Most of the remaining sites are between eight and 15m asl. The only exception is a small site, AG-22, on a cliff about 80 m high. When sizes are considered a somewhat different picture emerges. Only three small (size class 1) sites (9%) are found above eight meters, while two (67%) of the largest (size class 5) sites occur between eight and 15 m asl. This may suggest larger sites required more protection from storms and high water during winter, while smaller sites were used when this protection was not necessary.

McCartney (1977) defines exposure in terms of protection from the elements as well as the direction faced by the site relative to the sea (aspect). Protection from the elements was one of Jochim's (1976) prime considerations for settlement placement. In the Aleutians, sites may be located in bays, on headlands or on straight, open coasts. In the Near Islands 69% of all sites are located in bays, usually at the head. Headlands host only 11% of the sites. This effectively refutes Iokhel'son's contention that sites were located on headlands and only moved to bays after the Russians stopped aboriginal warfare. There is no obvious relationship between site size and headland locations.

The remaining 20% of Near Island sites are found on open coasts, most commonly in the Semichi Islands and along the north coast of Attu. Most of these sites are small, with 69% falling into size classes 1 and 2. This suggests these sites were used during seasons when protection from storms and surf was not a major problem.

Boat landing conditions are not readily ascertained from aerial photographs and maps. In general bays provide safe landings under most conditions. Headlands, by their nature provide two opportunities for landings; if one side is rough, the point may shelter the other. Open coasts offer the least protection for boat landings, with a beach approachable only under limited conditions. This suggests again that sites on open coasts were used when storms were least likely to restrict access.

Aspect, the direction a site faces, may be important when prevailing winds are considered. Near Island site aspect distributions appear random and local topographic considerations probably outweighed other criteria for site orientation.

Semisubterranean house construction requires relatively level ground and at least one-half meter of soil. This was not a problem in the Semichi Islands, where ample flat areas exist. Actually several areas seemingly suitable for building, lack sites suggesting that other criteria determined site locations when choice was possible. Sites on Attu concentrate in the flattest areas available; a small area of the north coast and the southeast portion of the island. In other areas sites are located at the heads of bays, usually near drainages. This is exclusively the case on Agattu, where the steep shores of the island are broken by numerous small streams entering small bays. Alluvial terraces at the mouths of Agattu streams are often the only low flat areas suitable for Aleut settlements.

In general sites were located where it was possible to build houses. Primary criteria included low elevation, flat ground, boat landing areas and probably protection from storms. Exceptions to these rules are generally small sites that probably had specialized functions or seasonal use. The geographic settings of sites suggest a few clues to site seasonality, but other criteria primarily determined when and why a site was occupied.

RESOURCE SPECIFIC ANALYSIS

Interpretations of site function are usually based on artifacts and food remains recovered during excavations. If a sufficient number of sites and site types are excavated researchers may discern patterns that allow inference of function in unexcavated sites. Too few sites have been properly excavated in the Aleutian archipelago to allow this inference. Assumptions regarding site utilization are often based on very scanty evidence and theoretical constructs. However determination of function is vital to interpreting settlement patterns.

Jochim (1976) considered proximity to resources to be the most important criteria in selecting site locations. He predicts sites closer to less mobile (rookeries and reefs), denser (rookeries, salmon, reefs) and less clustered (waterfowl, fish) resources. Veniaminov (1984) stated that Aleut villages were located next to their chief subsistence resource. McCartney (1977) found no correspondence between site locations and modern sea mammal or bird concentrations, but Clark (1990) noted a correlation with shellfish resources. Yesner (1977) predicted site function would depend on the diversity and density of local resources, with permanent settlements exhibiting the greatest variety.

NEAR ISLAND SITE CATCHMENTS

Site catchment analysis offers one method for determining site function without excavation, although little data exists to define the catchment of an Aleut site. Twentieth century subsistence studies of Aleuts hunting from power boats with rifles clearly do not reflect aboriginal patterns. Fox trappers in the early 20th century, travelled on foot, making 10-16 km loops around their trapping camps Prokopeuff 1988; Golodoff 1988). Aboriginal foot travel probably concentrated along the coasts and over trails and passes. Most terrestrial resources were available near the village, many economic plants grew right in settlements (Bank 1977).

Site catchment data for complex hunting-fishing peoples, or those using efficient water transportation, is rare. At Yagi, a Jomon site in Japan, researchers determined one and two hour effort contours for land based resources. Sea based catchments were based on canoe speeds approximating walking speed. Predictions of resource use based on resources available within the catchments were then successfully compared to the excavated faunal assemblage.

As maritime hunting and fishing people the Aleuts spent much of their time in boats, hunting and fishing or travelling to exploitation areas. Baidarkas also allowed efficient transport of game to the settlement. Baidarka capabilities, including seaworthiness and speed have been discussed in detail by boat builders and designers, Dyson (1986) and Zimmerly (1986). Dyson points out that many of the early explorers were not only careful observers, but their training in ship construction and seamanship made them particularly interested in baidarka construction and performance. This early information is especially valuable because the quality of Aleut construction and seamanship declined following the arrival of the Russians (Veniaminov 1984). The best kayaks, were easily able to overcome currents running at 6.5 knots (12 km/hr) in the interisland passes. The most proficient Aleut "sea riders" regularly travelled 120 versts (128 km)

at speeds between 7 and 10.6 km/hr. Greater distances at these speeds was possible but one paddler who covered 200 versts (213 km) in 25 to 30 hours, died soon after his arrival (Veniaminov 1984). Over short distances speeds approached 18 km/hr, but average cruising speed seems to have been about 11-12 km/hr (Dyson 1986:30-31,64).

Dyson (1986) and Zimmerly (1986) kayak researchers noted Aleut kayaks were superbly designed using boat building principles only recently rediscovered, to cut through the bow waves and reduce water resistance. Boat design and an intimate knowledge of wind, currents and waves allowed Aleut hunters to maintain high-speed travel in less than ideal conditions as well. Hunters regularly remained at sea up to 12 hours and could stay out for 12 to 15 days in calm water; six in rough seas. Hunters often had to be helped from their boats and warmed after long voyages and Gideon reports nose bleeds in hunters battling storms. Journeys were limited by the skin cover of the baidarka, which, unless dried and oiled periodically, would loosen and allow the boat to fall apart (Dyson 1986: Zimmerly 1986).

Based on ethnographic sources and modern kayak research, Aleut catchments would have been a series of half circles, oriented to the ocean. People on foot would range between 5-8 kilometers from a settlement. Much of this travel was probably along the highly productive sea coasts, rather than inland. Baidarkas greatly increased the distances coverable in a single day. Assuming baidarka expeditions for fishing, hunting, or travel to a gathering locale usually lasted one day, most trips probably stayed within 20 km of the settlement, though one-way trips of 60 km were theoretically possible.

In order to check these assumptions, I examined archeological and ethnographic data from five sites in the Near Islands. None of the faunal data is quantified and the site reports simply list the species encountered. Birds and mammals are generally reported in detail, shellfish receive some attention, but fish are virtually ignored. Sites are assumed to represent only part of the economic year. The nearest source, or concentration, for each species listed at each site was located and plotted on a map (Figures 17, 18, 19). Assuming people acquire resources from the nearest source, this defined minimum catchments for each site. The sites included:

AG-1 excavated by Albert Spaulding in 1949. This is a paired site, 1a is size class 3 and 1b is class 2. Spaulding did not report faunal remains by excavation unit so the sites are combined. The fish remains, said to be abundant, were not identified.

AG-2 was excavated by Ales Hrdlicka in 1939. This is also a paired site, size classes 4 and 2, and the faunal remains are not distinguished by site. Hrdlicka ranked the birds and mammals in order of relative frequency but fish were not identified.

AT-9 was excavated by Vladimir Iokhel'son in 1909-1910. No size estimate is available, Iokhel'son called it a large site, and it was probably at least a size 3. The site has been destroyed by military construction. Iokhel'son identified birds, mammals and shellfish as well as some fish.

SH-6 was excavated by Debra Corbett in 1990. This is a size 3 site. Faunal analysis is not yet complete but preliminary lists of shellfish, fish, mammals and birds are available.

The fifth site used is the historic settlement at Chichagof Harbor, AT-1. It differs from the others in several important respects:

1) Data were collected by BIA archaeologists during interviews with former village residents. In addition to a list of species used, the information includes locations and seasons of procurement.
2) The entire population of the Near Islands lived in the village.
3) Except for summer fish camps and fox trapping camps the site was occupied all year. Most subsistence pursuits originated in this settlement.
4) The site was located for the convenience of deep draft, sailing vessels, not necessarily for access to subsistence resources.

One problem immediately apparent from the sample is that no small sites are represented. Archaeologists have clearly selected the larger sites for excavation. Two of the largest sites on Agattu are included and the other two archeological examples are at least medium sized, though AT-9 may have been larger. The 20th century population of AT-1 was small but the site was a permanent village.

Although there is considerable overlap, several catchment circles, defined by clustering of resources, are shown on the maps. The smallest extends out in a one kilometer radius. Within this circle, in the examples cited, reefs, beaches, streams, inshore waters and a variety of terrestrial habitats provide shellfish, fish, shore and land birds and plants. Presumably this was the most intensively exploited zone.

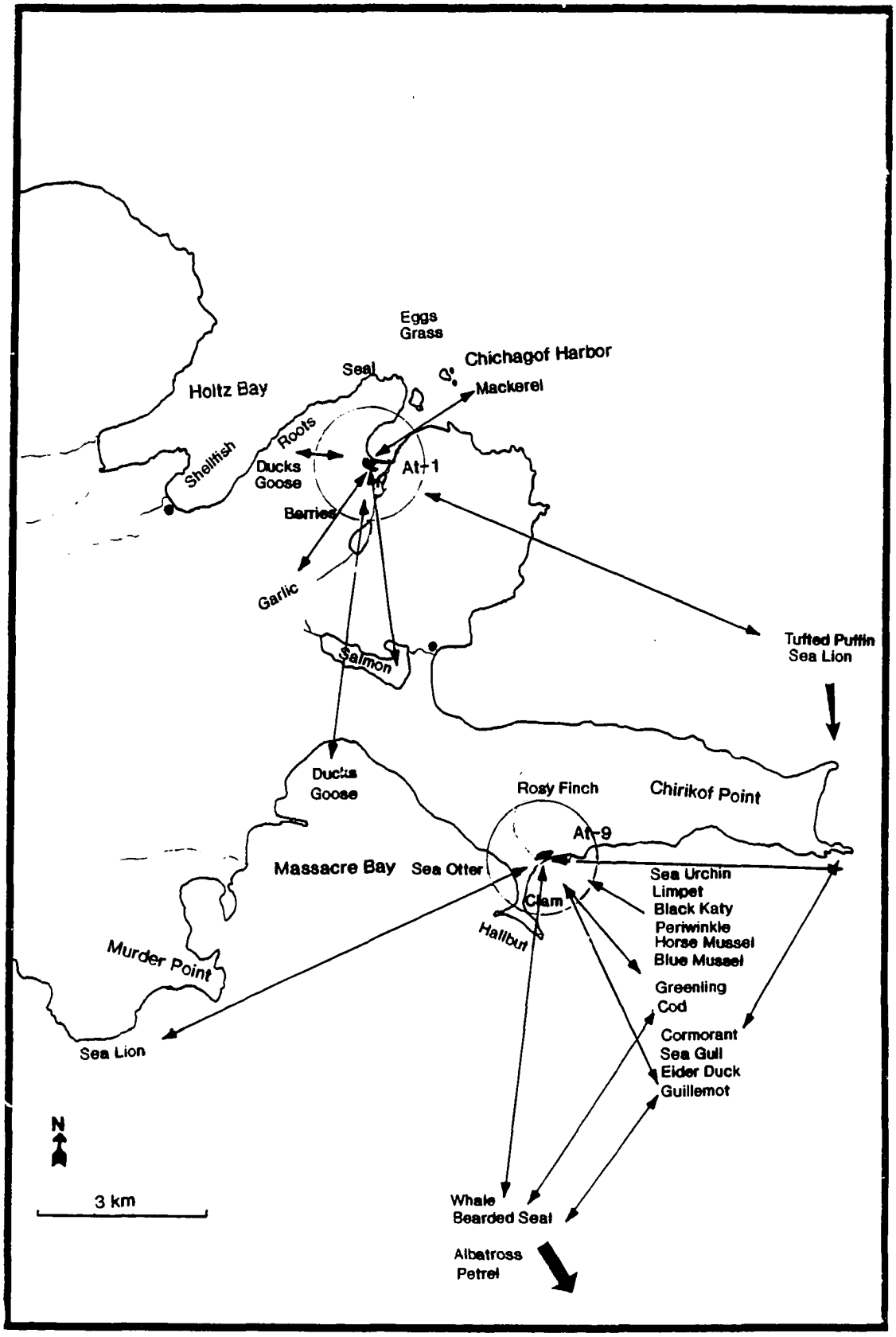

Figure 17 Attu Island Catchments

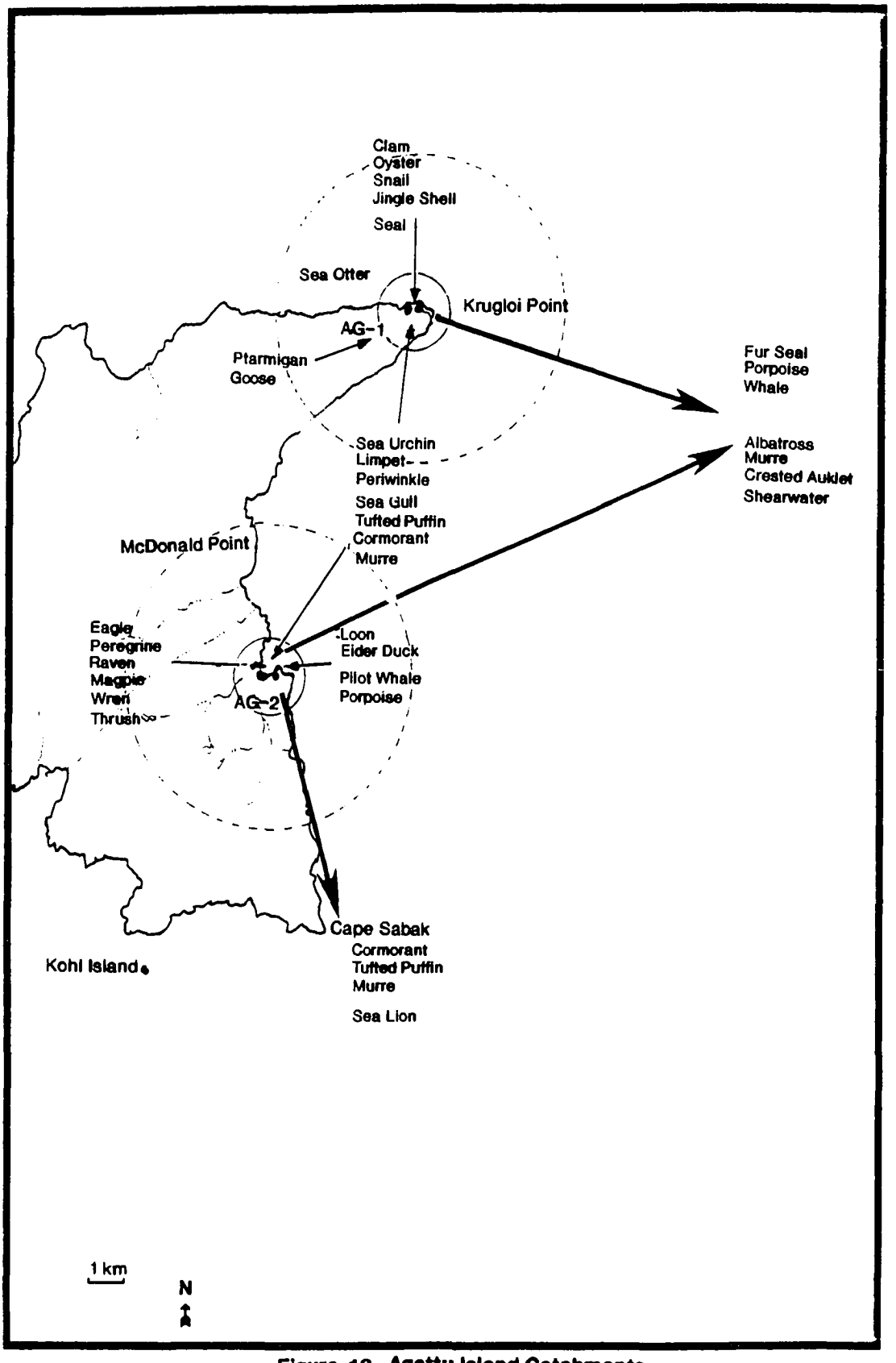

Figure 18 Agattu Island Catchments

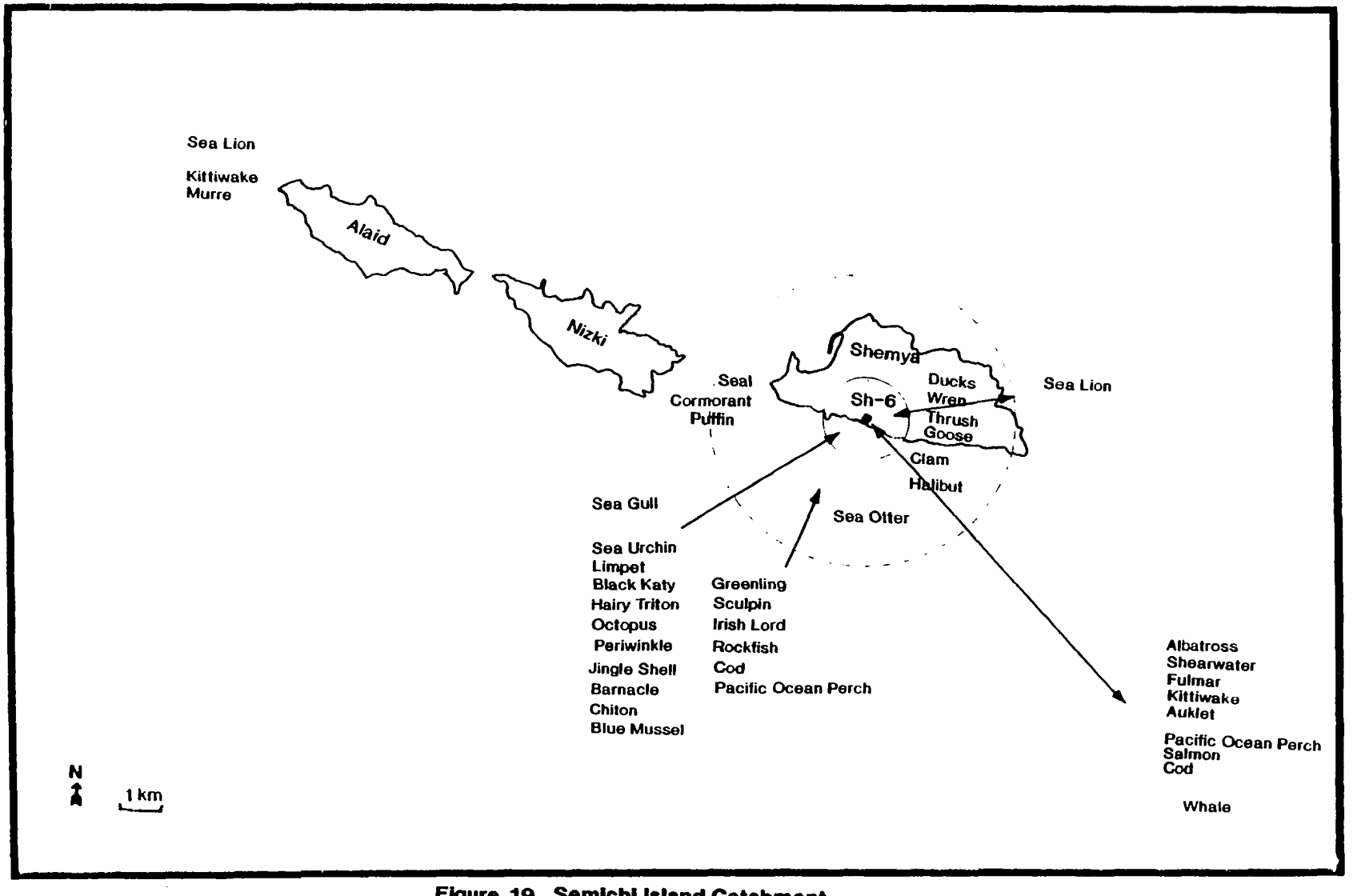

Figure 19 Semichi Island Catchment

The second catchment circle extends out in a three to four kilometer radius. For the sample sites, this wider circle adds waterfowl, cliff nesting birds, sea fish, seals and pelagic birds and mammals to the site resource inventories. Resources within this circle would have been accessible to people on foot travelling inland or along the beaches. The catchment also includes inshore baidarka fishing trips. These two circles correspond to Jochims (1976:55) mini and micro catchments, or what Watanabe (1968:75) terms the female activity sphere.

Beyond this, resources were collected within 10-15 km of the sites. These distances and resources would have required boats for efficient exploitation and transportation. In addition they may have required overnight stays of varying duration. Resources in this circle included sea lions, sea fish and waterfowl-especially geese. This corresponds to Jochim's (1976:55) macro-catchment and Watanabe's (1968:75) male activity sphere.

The next catchment circle encompasses boat trips of up to 60 km. Most of the instances of resources being collected from farther than 10-15 km come from AT-1 and may reflect the special status of that site. For example, the annual spring sea lion hunt took place at Cape Wrangell, 60+ km from Chichagof Harbor. This organized communal hunt involved only men who stayed away for several days, until the desired number of animals were taken. It was probably not a precontact phenomenon. Sea lions hunted opportunistically by individuals were taken within the area of the 10-15 km circle.

Catchment distances did not vary much between the sites represented in the sample. However, no small sites are included. If the smallest sites were resource specific camps they may be expected to have smaller catchments, assuming they were located as closely as possible to the desired resource. Catchments calculated using ethnography, technology and resource distributions are also internally consistent. However the small sizes of the islands and potentially large catchment sizes seem to preclude the use of catchment analysis to determine function and seasonality for specific sites.

SPECIFIC RESOURCES

Some resources are found in specific or defineable areas and allow correlation with site location and size. Some of these correlations suggest specific uses for some sites and a range of possible uses for others. In this section lithic material sources, water, salmon, bird and mammal

rookeries, reefs and shallow marine waters are examined for clues to site function and seasonality.

Lithics

This discussion is based on a detailed analysis of lithic materials excavated from SH-6 in 1989 (Corbett 1990). Most, and possibly all lithic materials for tools were derived locally, from the beaches fronting the sites. My analysis indicates that lithic materials, while appearing relatively homogenous, having a weak to moderate conchoidal fracture, dark gray to green color and fine grain size, in reality represent a bewildering variety of stone. Of these, sandstone, siltstone, arkose, graywacke, chert, and argillite are widespread throughout the island group. Some very distinctive materials (gabbro, diorite and dacite) found In narrow dikes or sills, are also widely distributed. However several rock types, including two of the most popular, may originate in restricted localities on one or two islands, and provide clues to interisland exchange or acquisition of materials.

The two most abundant rock types found at SH-6 were siliceous tuff and propyllitized andesite (Corbett 1990). The chert-like tuff is widespread, but this particular material is finely laminated and probably originates on the north coast of Agattu (Figure 20). Many of the flakes and tools retain a portion of flat bedding plane cortex, indicating it was quarried from beds, rather than collected from the beach. Other possible sources of siliceous tuff are northeast Shemya and central Attu, from Sarana Bay to Abraham Bay. Propyllitized andesite is common on Agattu, particularly at Otkriti Bay, Gillon Point and from eastern Armeria Bay to Binnacle Bay. Native copper, source unknown, was identified in some of the propyllitized andesite. Another tool collection, knives, projectile points and scrapers, found on Shemya in the 1970s, is of argillite, a material only found on Agattu.

Less common materials from SH-6 are even more distinctive and restricted than the tuffs and andesites. Carbonaceous shale is reported only from the Chirikof Formation on the south side of Chirikof Point. This material was probably collected at the source or traded. Nodules of siliceous marl- or limestone are "conspicuous in shore platforms" at Chuniksak Point, Attu (Gates et al. 1971). A distinctive shiny green diabase is found in small pockets along Nevidiskov and western Temnac Bays and just east of Alexai Point. The few pieces of pumice found at SH-6 were probably collected off beaches, or traded from the Rat Islands. There is no source for this material in the Near Islands.

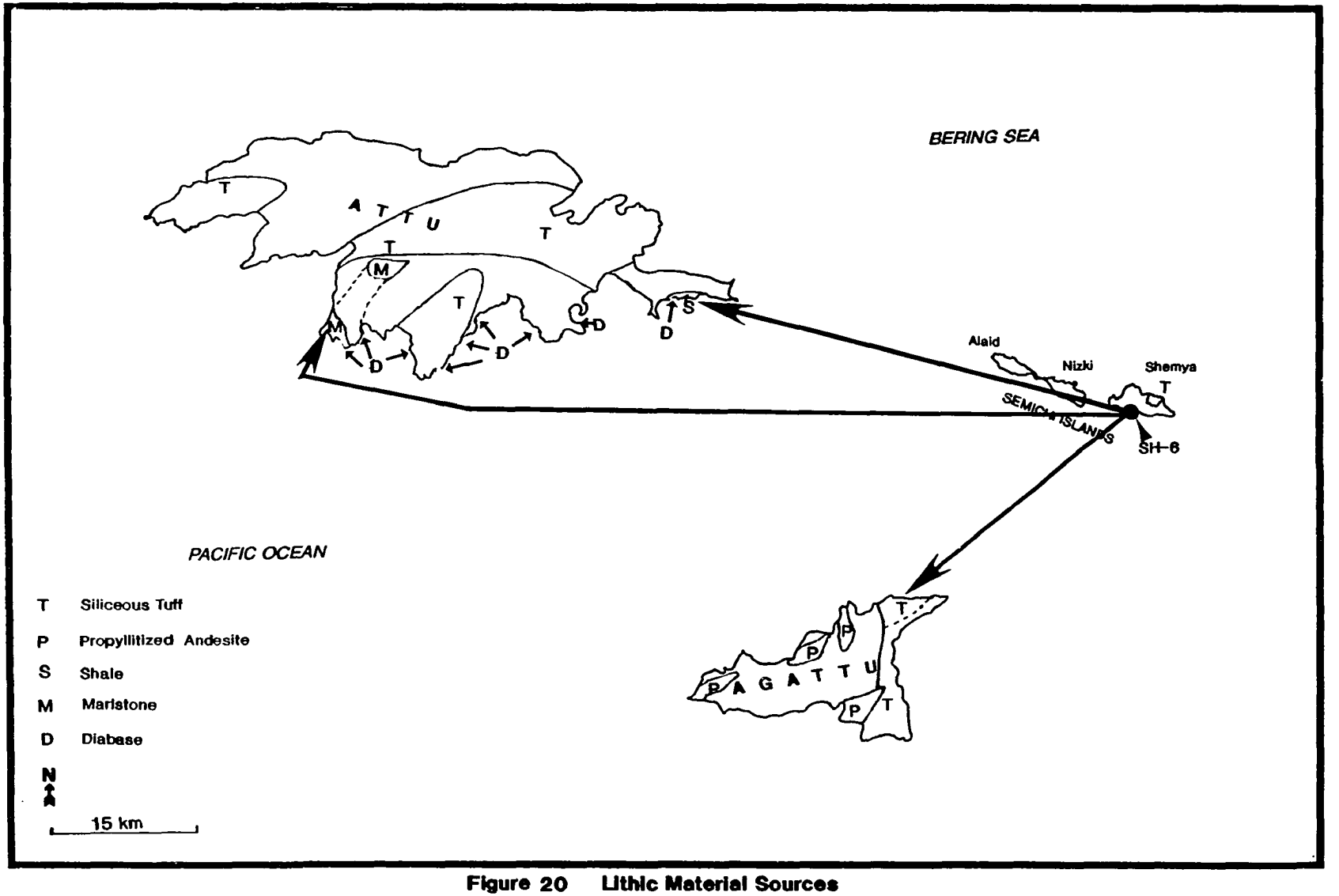

Figure 20 Lithic Material Sources

The presence of rare materials or those with limited distributions may indicate travel to the source locale or trade within the island group. Lithic materials are the only archeological resources which indicate contacts among islands of the Near Island group.

Fresh Water

Only 5 sites are located more than 1000 m from a known source of fresh drinking water. Four of these are in size classes 3 or 4. Though water is not generally a problem in the wet Aleutians these two factors together may suggest these sites were occupied in fall and winter months rather than the "drier" months of June and July.

Anadromous Fish

A total of 21 sites (20%) are located on salmon streams or potential salmon streams (Table 10). Of these, 12 (57%) are size classes 1 and 2, five (23%) are sizes 3 and 4; the remainder lack size estimates. No sites in the largest class are on salmon streams. Looked at another way, 21% of the small sites and 22% of the medium to large sites are on salmon streams. While a few small sites seem to have been primarily salmon fishing sites, these numbers do not reflect a strong preference for locating large sites on salmon streams, or for limiting such areas to small seasonal occupations.

Table 10 - Fresh Water and Salmon Streams

Size Class	At	Ag	Sem	At	Ag	Sem
	more than 1000m to fresh water			Salmon Stream		
1	-	-	-	3	4	2
2	-	-	1	2	2	
3	1	1	-	2	1	1
4	1	-	1	1	1	-
5	-	-	-	1	-	-
?	-	-	-	4	1	1

Bird Rookeries

Bird rookeries are common to the shores of all islands, and were important to the Aleuts. Nine sites are located within 3 km of large rookeries with thousands of nesting birds. Of these, four (44%), are size class 1, with another one (11%), in size class 2. Two sites are in classes 3 and 4, the last two are of unknown size (Table 11). Other things being equal, the small sites (classes 1 and 2) located at or near bird rookeries may be considered resource procurement locations with birds as the resource. Certainly AG-22, on top of the cliffs over a rookery, was a resource specific site. A large dike slanting down the cliff face may have served as an access route for men climbing down to retrieve birds and eggs.

Sea Lions and Seals

Modern sea lion and seal haul-outs and rookeries are scattered irregularly around the islands. Only seven sites are located within 3 km of rookeries, possibly reflecting a concern with avoiding disturbance which could cause the animals to abandon an area. Two sites each are of size classes 1 and 2, with one each 3, 4 and unknown (Table 11). Both class 2 sites and the one of unknown size are also located at or near bird rookeries, suggesting a dual function for these small sites. The sizes of the two larger sites make it unlikely sea lions or seals are the sole reason for their locations, though it may have been one of several factors influencing use.

Table 11 - Sites with Sea Lion and Bird Rookeries

Size Class	Attu		Agattu		Semichis	
	Birds	Sea Lions	Birds	Sea Lions	Birds	Sea Lions
1	1	1	2	-	1	1
2	1	2	-	-	-	-
3	-	-	1	1	-	-
4	1	-	-	-	-	1
5	-	-	-	-	-	-
?	2	1	-	-	-	-

Reefs

To test Clarks (1990) assertion that reefs were an important criterion for site placement, and to indirectly evaluate the importance of shellfish to the Aleuts, distribution of reefs and sites was examined. Reefs were not directly measured; rather a subjective determination of relative size was made from aerial photos and navigation charts. Within 1000 m of a site, reefs were divided into three categories, none, present and large. Present included everything from small discontinuous rocky outcrops to long narrow shelves. Large meant shelves extending 50 or more meters offshore and dominating the local coast, often extending for several kilometers. Division of large from "present" reefs was sometimes difficult. As most sites are near reefs, the none and large categories were of the greatest interest. Over 30% of all sites lacked reefs (Table 12). However, no large size sites lacked a reef. At the other end of the scale only 13% of all sites had very large reefs, primarily because low numbers of small sites (7 to 12% of classes 1 through 3) occurred in these locations. Four (50%) of size class 4 and 1 (33%) size class 5 sites are on large reefs.

Reefs are less important to small sites because they were generally used as specific resource procurement localities and were only occupied for short periods. Small sites on large reefs were probably placed for access to other resources with the reef a secondary consideration. The presence of a reef is apparently necessary for the establishment and support of larger and more permanent settlements, at least in the Near Islands.

Table 12 - Reefs

Size Class	At No Reef	Ag	Sem	At	Ag Reef	Sem Present	At	Ag Large	Sem Reef
1	5	4	3	5	9	3	1	2	1
2	6	1	1	3	8	3	1	1	-
3	2	4	-	4	1	1	-	-	1
4	3	-	1	1	1	1	2	-	2
5	-	-	-	2	-	-	-	-	1
?	3	-	1	9	3	2	-	-	2

Offshore Environments

Shallow waters with rocky bottoms generally support a more varied and abundant population of fish than do deep (>30 fathoms, 55 meters) waters or sandy bottoms. Navigation charts provide information on bottom conditions, especially near the islands. A shallow submerged wave cut platform of varying width encircles all of the Near Islands. This shelf has a similar configuration on all islands, with a narrow band along the north coasts and wider stretches to the south and east (Figure 21). On Attu the southern shelf is up to six times as wide as the northern. On both the Semichis and Agattu the southern band is about twice as wide as the northern. While rocky areas support greater variety and numbers of fish, some of the most valuable, such as greenling, great sculpin, red Irish Lord, herring, Atka mackerel and halibut are also found in sandy areas. Ideally for subsistence purposes a wide, predominantly rocky shallow shelf, would be interspersed with large sandy areas.

The Semichi Islands are surrounded by the most extensive area of shallow waters in the Near Islands. The platform averages 3100 m wide, but off the eastern tip of Shemya extends out 20 km. This shelf is predominantly rocky with several near surface shoals. Sandy areas are concentrated between Shemya and Nizki and between Nizki and Alaid. Smaller patches of sand are scattered around the coast of Nizki.

The average width of the shallow waters around Agattu is 2700 m. This narrows to between 750 and 1800 m on the north coast and widens to over 4000 m off Otkriti Bay. In general the southeastern coast of Agattu has a wider coastal shelf than the rest of the island. Although the rocky substrate dominates, sandy bottoms are found off all coasts. Four of the six largest sites on Agattu are found along the coasts dominated by the wider shelf.

Attu is surrounded by a narrow band of shallow water which averages only 2200 m wide. However a shelf as wide as 15 km surrounds the eastern end of the island from Sarana Bay to Temnac Bay. This is predominantly rocky, particularly in Massacre Bay, and is dotted with large reefs and shoals. Abraham and Etienne Bays are also wide, 6000 m, shallow shelves with rocky bottoms and patches of sand. These areas coincide with the locations of nine of the 13 largest sites on the island. In contrast, Holtz Bay, Nevidiskov Bay, and Stellar Cove have predominantly sandy bottoms on narrower shelves which may contribute to the small sizes of sites in these areas.

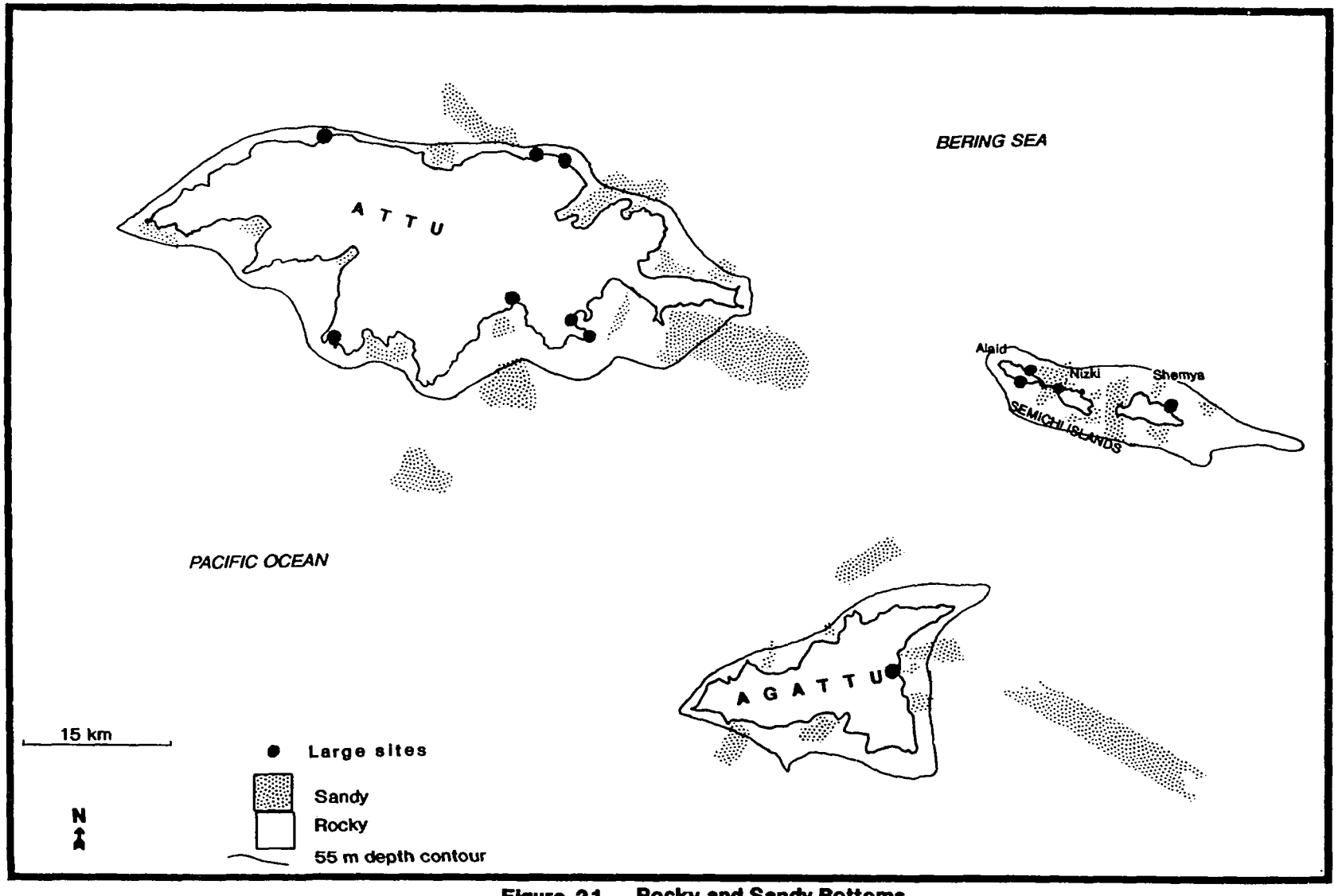

Figure 21 Rocky and Sandy Bottoms

The shallow submarine shelves surrounding the islands, rich in fish and the creatures that feed on them also supported large human populations. The relationship is most clearly seen on southeast Attu where the islands largest sites are surrounded by large areas of shallow rocky water. The wide shallows around the Semichi Islands helps explain the density of the aboriginal population of those islands. This correlation also underscores the importance of fish in the diet of the Aleuts.

OTHER DETERMINANTS OF SITE FUNCTION AND SEASONALITY

OCEANOGRAPHIC AND CLIMATIC INFLUENCES

The Aleuts spent a lifetime learning to interpret wind and current conditions. An individuals own hard won empirical knowledge was supplemented by the accumulated wisdom of the elders. This knowledge cannot be reconstructed by terrestrial anthropologists using aerial photos, maps and oceanographic reports. However general conditions can be described and may be of some use in analyzing settlement patterns (Figure 22).

Although circulation patterns in the north Pacific and Bering Sea are generally understood, and local conditions are described on navigation charts, details are lacking. Major features include the Alaska Stream flowing north around the west end of Attu and the Bering Current, flowing east to the north of the islands. Local effects included seasonal currents, rip tides and wave rebound.

The effects of wind tide and current on Aleut settlement patterns will never be known with any certainty. They were probably not major factors in site placement but may have affected the function and seasons of use. The Aleuts used winds and currents to facilitate baidarka travel; favorable conditions could shorten travel time to a fraction of that needed for paddling. On the other hand, contrary winds and tides could keep hunters stranded on shore. Inability to launch baidarkas for hunting or fishing was one of the leading causes of periodic food shortages. Rip tides and currents in the intertidal passes were also a source of danger and were greatly feared.

There is no obvious relationship between known current and tidal conditions and the distribution or size of sites. On western Attu, topography limited the areas suitable for occupation on the west end of the island but the strong currents typical of that area may have conspired with other factors to keep the sites small. Weaker currents around Agattu and southeastern Attu may have contributed to the greater density of sites in those areas.

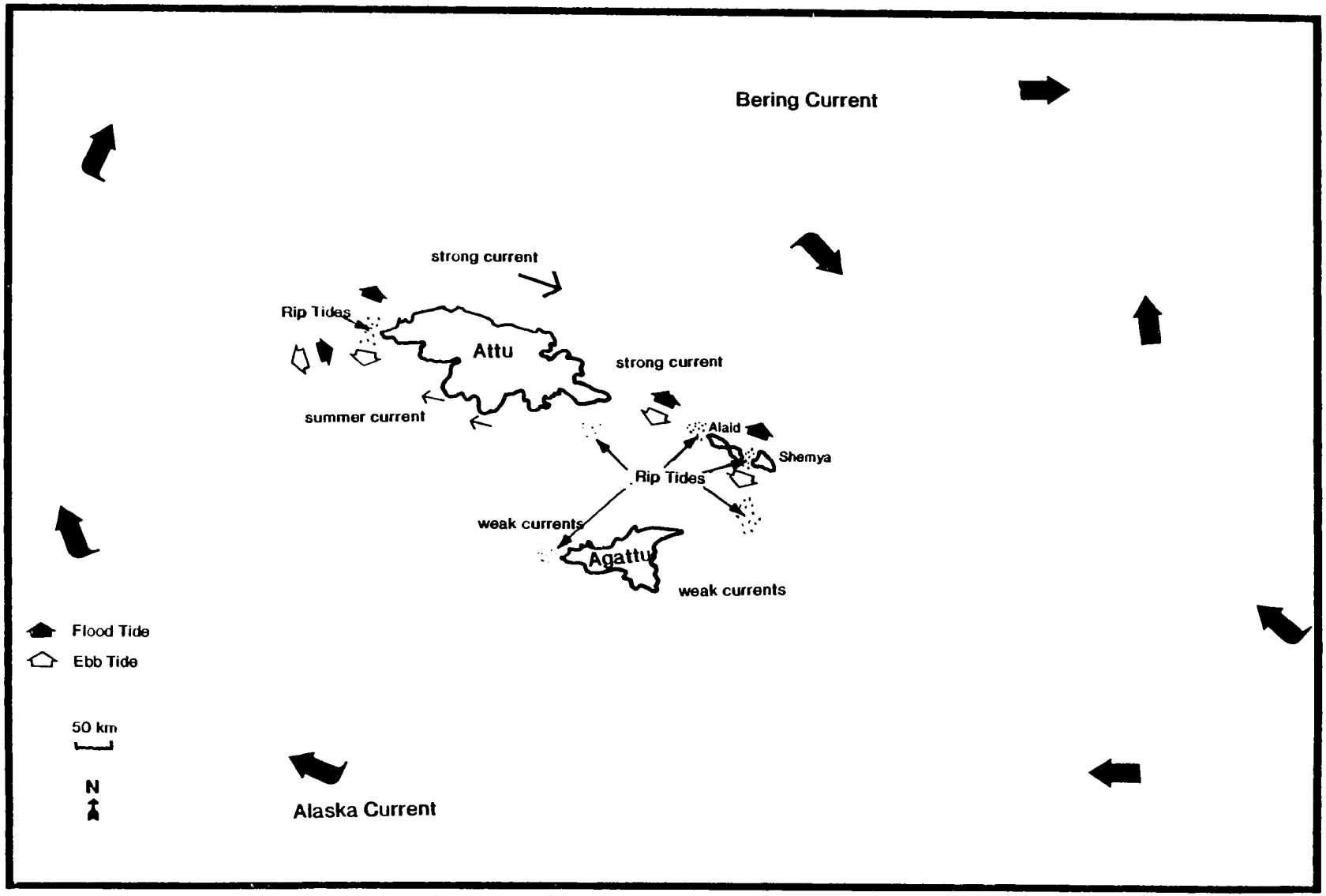

Figure 22 Near Island Currents

WINDS AND WILLIWAWS

Presumably much of Aleut weather forecasting was concerned with wind speed and direction. In general, sites in bays are protected from all directions except those opening into the ocean. Agattu and the Semichis offer few protected harbors and are exposed to most climatic influences, although the mountains and cliffs on the north shores of these islands deflect south and west winds. Attu presents a more complex picture due to its large bays and valleys. Etienne and Abraham Bays are fully exposed to winds from the south and west. The head of Abraham Bay experiences high winds even when the mouth is calm. Temnac Bay is somewhat protected from the southwest but open in all other directions. On the north coast, east winds send rolling waves into Stellar Cove, which is also exposed to the north. High winds are channelled through Holtz Bay, particularly in the fall and winter. Only Chichagof Harbor and Massacre Bay are protected from every direction by shoals and islands.

Local effects of the mountains are complicating factors in determining the influence of climate on settlements. Katabatic winds, or williwaws, can occur at any time but are more common in the winter. The danger would be particularly acute for men in baidarkas, as sudden blasts of hurricane force winds could flip the boats. Mountainous areas of northern Attu and Agattu and locations in bays otherwise sheltered from high winds, are particularly vulnerable as valleys channel the winds. In areas vulnerable to williwaws, sites on open coasts may be safer than those in bays (NOAA 1985).

TSUNAMIS

Tsunamis can originate anywhere in the Pacific Ocean basin, or from Kamchatka, and strike the Aleutians with little or no warning. There is no record of any destructive tsunami activity on the Bering Sea coast of the Aleutians; the danger is from the Pacific Ocean. As the maximum recorded runup height in the Near Islands is 10 m, the distribution of sites above 8 m in elevation was examined. Of 48 sites on the south, or Pacific Coast, only eight (17%), were above 8 m in elevation. On the other hand of the sites at the higher elevation, 18 (44%) were on the south coasts, with 22% on the north and 17% each on the east and west. Size was of little use in clarifying possible tsunami influence on site occupation. Half of the elevated southern sites lack size estimates and the other four fall into all but the largest (5) size class.

There is little obvious correlation with wind and tsunami danger and site location or size. Semisubterranean house construction rendered settlements safe from even the strongest storms. Some areas may have been avoided during certain seasons but the relationships are not apparent in known site distributions. The total unpredictability and relative rarity of tidal waves precluded adjustment of settlements to cope with the threat. The vast majority of small tsunamis may have passed unnoticed. The rare large wave might inundate a sleeping village; during the day observers would presumably provide warning of an arriving tsunami.

PASSES AND TRAILS

Passes across islands can shorten travel time and expand access to resources by increasing the area exploitable from one site. Passes may also be used to escape from enemies, enabling people to flee either to a friendly village, or distant refuge. Several trails are known from historic records and ethnographic sources (Dall 1899; Dirks 1988; Golodoff 1988). Many of these are trappers trails, used to travel to remote cabins on Attu and Agattu. Some of these probably have little time depth, but trails over mountain passes and between bays may be quite old.

The Near Islands have few good portage routes. Attu and Agattu are wide and mountainous. Seven trails on Attu range between 7 and 19 km, with four of those between 10 and 12 km long. The lengths of three portages on Agattu range between 5 to 6.5 kilometers (Figure 23). Crossing these distances on foot would take most, if not all, of a day, especially if boats were being moved overland. The small size of the Semichi Islands precluded a need for long portages, and the terrain made multiple routes across them possible.

All of the large, and presumed large, sites at the east end of Attu are well connected by trails. The concentration of large sites on eastern Attu may be partially explained by access to approximately half the coastline of that island through the series of passes and trails. The picture is less clear for the western half of the island. One small trailhead (AT-32) links two large sites, AT-37 and AT-31. A second trail from AT-29 links large site AT-27, with a cluster of three or more sites in Stellar Cove as well as with the eastern end of the island via Temnac Bay (AT-17).

On Agattu, sites at either end of the cross island trails are small but clustered; four sites in Otkriti Bay are linked to three in Armeria Bay. The second trail leads from one small site

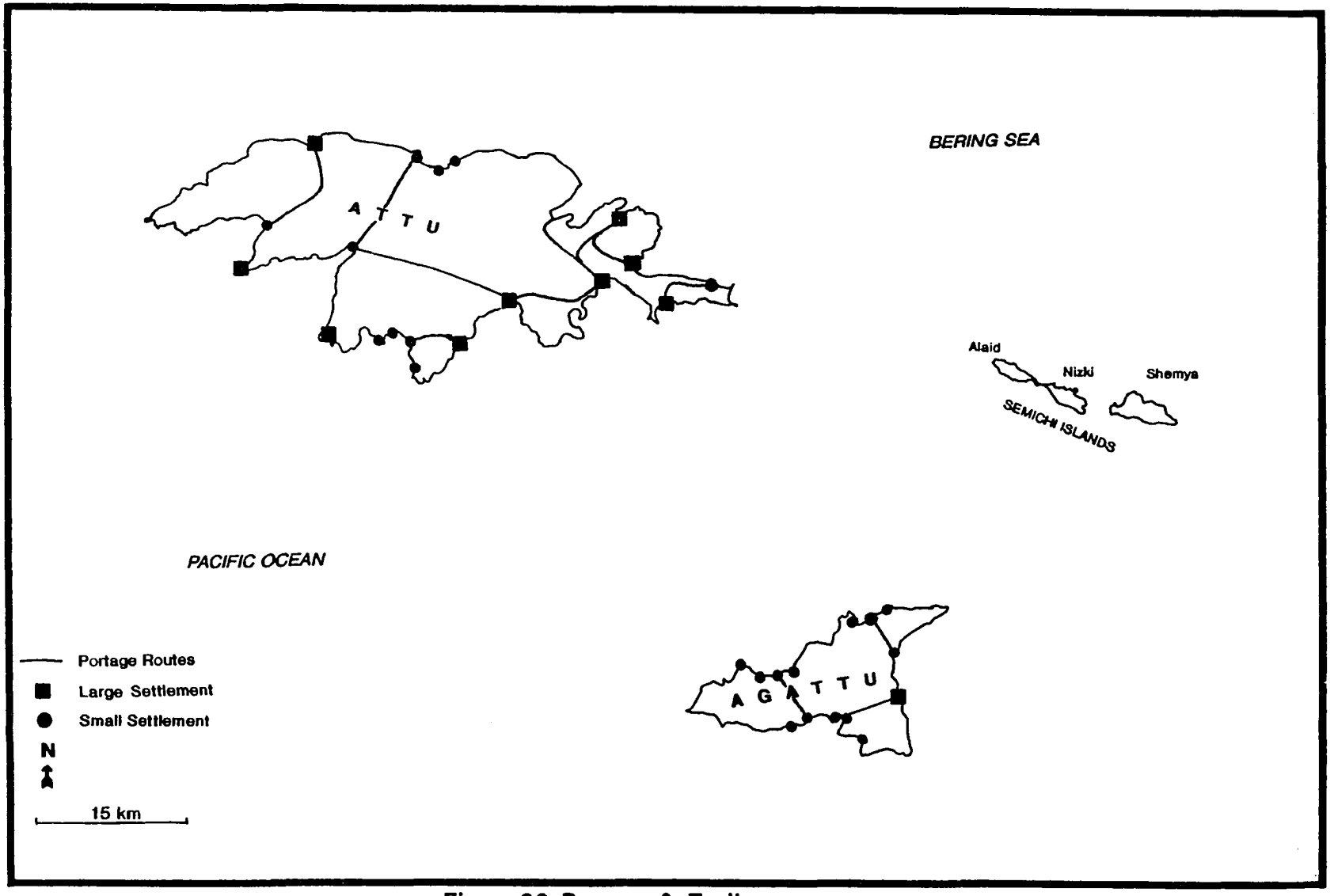

Figure 23 Passes & Trails

(AG-19), between two large ones (AG-1, AG-2), to four small ones around Patricia Bight. The trail from the largest site on the island, AG-2, leads west to the sites in Karab Cove and Otkriti Bay.

Near Island trails were not short, easy passes across the islands. They were, however, vital economic links to all parts of an island. The greater access to resources provided by trails on eastern Attu, may help explain the concentration and large size of sites there. Elsewhere, trails show links between major settlements, and between large villages and their satellite and seasonal camps. Understanding the settlement patterns of the islands requires attention to the land links between the sites, as well as to the marine environment.

OBSERVATORIES AND DEFENSE

These two factors are particularly difficult to determine from aerial photographs and available survey information did not expressly record pertinent information. Jochim lists an observatory as one of the basic criteria influencing site location decisions, but does not consider defensive needs in his settlement decision scheme. Nearly all Aleutian researchers stress the need for elevated observatories near villages to scan for game, returning hunters, and travellers and approaching enemies. Such lookouts could also be used as satellite work areas and to observe the weather. Most Near Island sites are close to bluffs or hills which could serve as observatories. In flatter areas, house roofs could provide some elevation. Sites inside bays have a limited field of vision although the view would encompass the whole bay. Sites on open coasts have the broadest panorama, but low elevations limit the distance of observations. Though specific information is lacking, observatories are assumed to have been generally available at all sites.

Little is known of Near Island Aleut warfare and defensive strategies. The Russians reported the Near Islanders were under military pressure from Central or Atkan Aleuts. Traditional tales told of the destruction of entire populations in war. The Agattu Aleuts could muster a sizeable defensive force given sufficient warning; 100 men met the first Russian ship to arrive off the coast (Berkh 1974). An Aleut raiding party would have fared poorly against such a group. This show of force was not repeated when the Russians visited Attu and may indicate a stronger defensive organization of the polity on Agattu.

The Near Islands lack steep offshore rocks, common to the eastern islands, that are suitable for refuges. Most sites lack obvious defensive characteristics but Polonskii reported a bluff top village on Attu defended by sharpened stakes on the slopes (Black 1991). Virtually all sites (83%) are located below 8 m in elevation, 89% are at the heads of bays or exposed on open coast lines. Bluffs near most sites may have served as both lookouts and refuges, and generally limited attacks to one direction, from the sea, thus providing a measure of security. However, an uphill escape route might expose refugees to attack. Also Atkans tell of raiders arriving overland and attacking down hills into sleeping villages (Prokopeuff 1988). Even so a village on or flanked by bluffs probably had a defensive advantage over those without.

Though most sites seem to lack defensive advantages aside from bluffs, exceptions occur. AG-22 perched atop the cliffs of eastern Agattu may have served as a watchtower for the island group, although its primary function was probably bird hunting. In addition 2 (67%) of the largest sites and ( ) of size class 4 sites are found above 8 m in elevation. Finally, seven of the nine largest sites on Attu, and four of the six largest on Agattu are located on the eastern or southeastern coasts, facing the direction of greatest threat. Defense may be added to the other advantages discussed for these sites positions. Based on the distribution and sizes of sites one defensive response of the Near Islanders seems to have been to concentrate their population in the direction of the greatest threat.

SYNOPSIS

The geography of the islands defines possible locations for sites and sets the size parameters. Geography provides few clues to the function of a site, though exposure may limit occupation to certain seasons. Likewise wind, tide, and current are not seen to affect site placement but may influence function and season of use. Favored areas for sites include protection from waves and wind, usually in bays, beaches for boat landings, elevations below eight meters, and sufficient flat ground and soil development to build houses. Large sites at higher elevations may have been more protected from winter storms than lower sites. Exceptions to these generalizations are usually small, probably resource procurement stations.

When site sizes and distributions are matched to resource distributions, determinations of site function are sometimes possible. As expected these determinations are easier for small, single purpose sites. Twenty nine of 58 small sites have tentatively been identified as resource procurement stations (Figure 24).

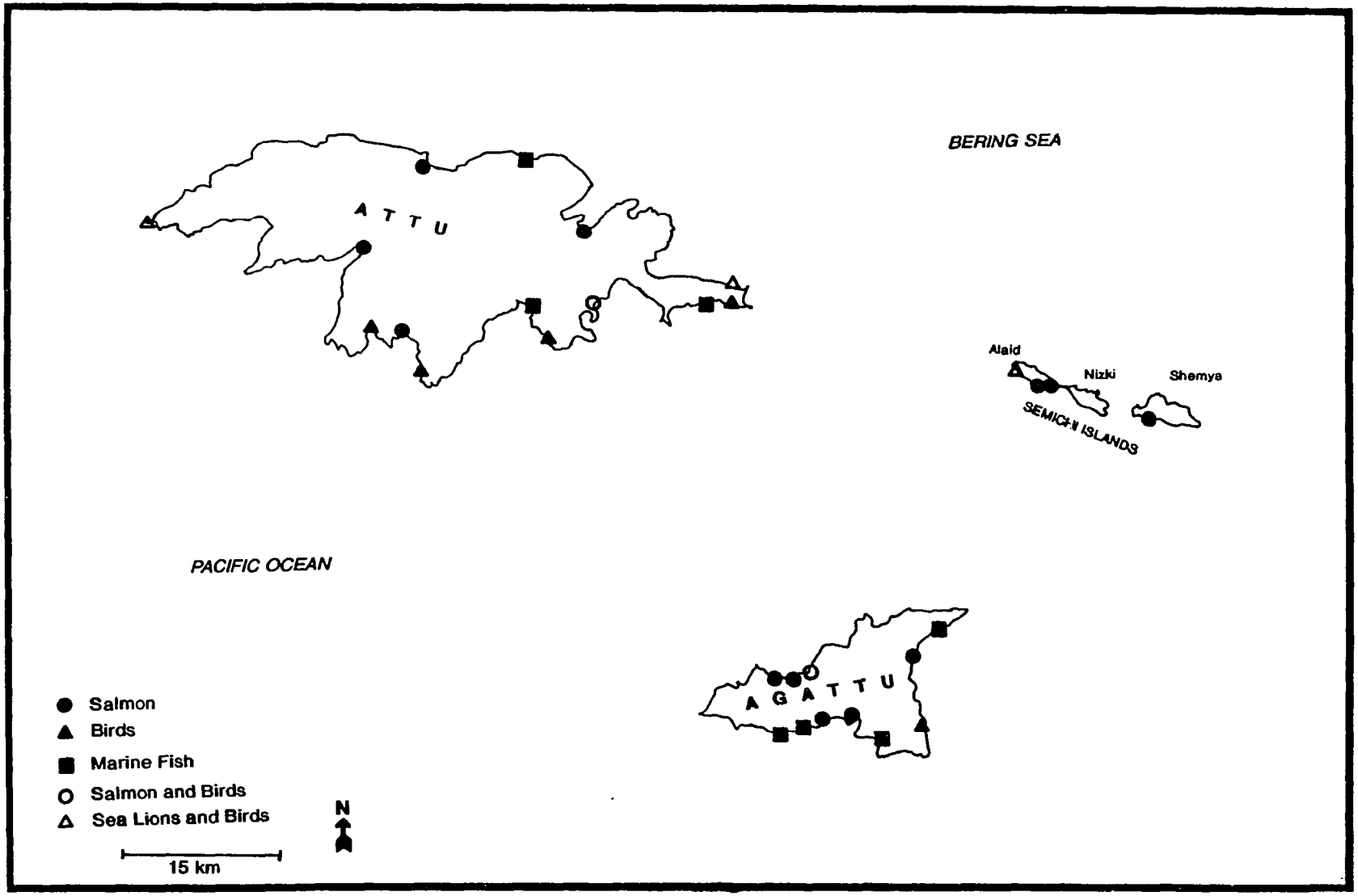

Figure 24 Summer Resource Procurement Stations

At these sites, one or two resources appear to have been of paramount interest, though other resources were probably collected when available. Based on resources exploited and, in some cases local topography, these sites were used during the summer, between May and August. Most of the other small sites not included in this section were also probably summer procurement stations, but from the data available a specific resource could not be identified.

The largest sites are probably primary winter villages for each island polity. As Yesner (1977) predicts, these settlements are in the areas of greatest abundance and variety of resources. The presence of two of these sites in close proximity on Attu cannot be explained by geographical or resource distributions, and may reflect temporal or social variables. These large sites were probably permanently occupied but the population would have been greatest in winter, from late October to January.

Intermediate sized sites (classes 3 and, except on Agattu, 4) are the most difficult to classify (Figure 25). They probably served a variety of functions, and for some, the functions may have changed over time. These sites have been called satellite camps (Clark 1990), subsidiary winter villages (Martinson 1973), summer villages (Martinson 1973, Miraglia 1986) and seasonal camps (Aigner 1973, Yesner 1977). For some a resource or multiple resource focus could be identified, but for most a range of options was pursued.

In conjunction with these site identifications, portages identify other site relationships. The picture is blurred on Agattu and the east half of Attu due to the density of sites. However, on the western end of Attu trails link winter settlements with summer villages and resource procurement stations in patterns suggesting seasonal interrelationships.

The Near Island settlement system included a wide variety of site types within the basic "midden" classification. A large winter village on each island, in areas of the greatest resource potential, probably housed most of an island's population during part of the year. A number of smaller winter settlements also existed, the number varying with island population, resource availability, and warfare pressure. "Summer" settlements are located in areas of moderate resource diversity, and are smaller than winter villages. Several of these may have been used during late spring, summer and fall. The most abundant sites, resource procurement stations, located near the greatest abundance of seasonal resources were probably occupied briefly, usually in the summer, and may not have been used every year. Other types of sites, including caves, blowouts, and non-midden temporary camps, were also part of the settlement system.

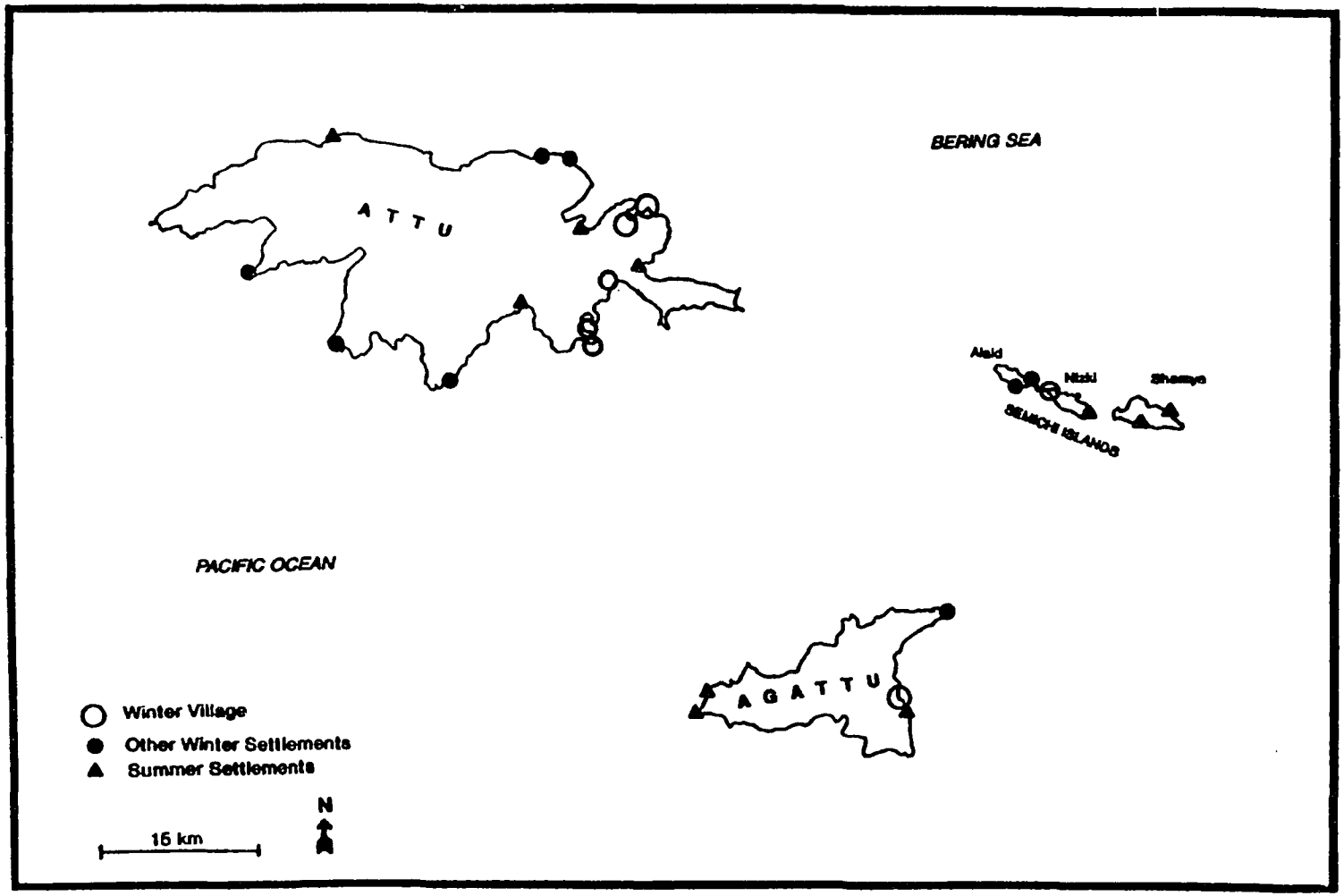

Figure 25 Winter & Summer Settlements

CONCLUSIONS

Many Aleutian researchers discuss settlement patterns as part of their analysis, but none have looked at an entire island group, or a wide range of variables. Work on settlement patterns has been greatly hampered by the lack of reliable, comparable site inventories. To partially overcome this problem, aerial photography has proven a valuable tool for locating and superficially describing midden sites. Photographs will never replace a thorough ground survey; some types of sites, caves, blowouts, and non-midden sites are not visible in even the best photos. However, used carefully they can show location, local topography, size and, in good quality photos, features.

The first goal of this thesis was to evaluate site and resource distributions for clues to site function and season of use. Using the best known site type, middens with house pits, I analyzed the settlement patterns of the Near Islands. For an analysis of this type to be of any value, all of the sites in a group should be examined; a single island may not show patterns clearly visible in the larger sample. Site sizes form the basis of comparisons. Sizes based on the area covered by features, and/or defined by vegetation differences are more reliable than feature counts for three reasons: 1) features are hard to define even on the ground, 2) they may be impossible to discern in aerial photos, 3) surface disturbance may distort features but seldom completely destroys a site. The distribution of resources is of vital importance in any determination of site function. More variables included in the analysis increase the reliability of the determinations. For most of the Aleutians the distributions of sea mammals and colony nesting birds are well known and often include population estimates. Other birds and some fish are more generally known, the locations of significant concentrations can be determined. Most fish and shellfish distributions are based on vague data and inference from large area surveys. The general geology of the islands is also known but additional field work is necessary to pinpoint material sources.

Patterns of seasonal resource use are discernible in site distributions. A large number of variables, often interrelated, must be examined to form the tentative picture proposed. Further work may discover other variables of equal or greater value in determining site function. Better resolution of some resources, for instance, fish could clarify a number of site functions. All

conclusions based on this type of analysis must be considered "best guesses" and need testing through excavation.

The easiest sites to define specific uses for are the smallest, most of which appear to be summer camps for procuring one or a few specific resources. These are scattered around the shores of all islands, near the desired resource and were probably used by small groups for short periods of time. Larger sites present a more complex picture. To support a larger group, for longer periods of time, required a wider resource base. Access to sufficient foods was ensured by proximity to medium and high density resource areas. Trails and passes increased the area accessible to a site and many of the largest sites have land routes to other bays. Proximity to certain resources suggests some sites were "summer" settlements, also used in spring and fall, and winter settlements with primary occupancy from early winter through late spring.

The number of environmental variables obscures cultural, that is social, political or religious determinants of function. Overland trails and intergroup exchange of lithics provide clues to social factors operating in settlement patterns. Though inconclusive the picture is a complex web of connections across and between islands. Trails show links between large sites and clusters of small sites suggesting the major part of a communities seasonal economic cycle. Connections with other large settlements may indicate intervillage social ties. Warfare is, at best, indirectly seen in settlement patterns. Population concentrations on the southeast coasts of Attu and Agattu may suggest a defensive posture, but subsistence factors also make these attractive locations for human occupation.

In evaluating the Aleut resource use strategy, using past excavation data and distributions of sites, it is apparent a broad approach characterized the Aleut food quest. All types of mammals, including those rarely seen, were hunted or used when beached. Birds, ranging from large albatrosses to tiny passerines, are plentiful in middens. A variety of shellfish were eaten, some, like sea urchins in huge quantities. Data on fish is incomplete but again a wide variety including small, 12 to 15 cm reef fish were caught. Proportions of each of these in the diet is unknown but evidence clearly shows use of a wide range of animal life.

The Aleuts were a top predator in their environment. At the time of contact the population may have been at the local carrying capacity. Laughlin (1980) estimated that 1000 people lived in the Near Islands, a figure supported by incomplete early Russian population estimates of 800+ for

the group. They exploited local resources with an elaborate, well developed technology. Though the Russians imported metal in quantity, replacing the original stone points and knives, the basic toolkit changed very little. Aboriginal hunting gear and baidarkas proved the most effective means of capturing game. The greatest technological contributions of the early Russians were in fishing. Introduced seines for ocean fishing and weirs on rivers, greatly increased catches of cod, Atka mackerel and salmon. The Russians also introduced new food storage techniques; smoking and salting of meat and fish, which alleviated late winter food shortages and periodic starvation.

FOR THE FUTURE

Many questions about Aleut prehistory in general, and western Aleutian prehistory specifically, remain to be answered. Basic cultural historical questions include the timing of the original occupation of the Near Islands and the nature and extent of contacts from the east and west throughout the history of the group. Cultural chronology and artifact typology are still needed. Culture change, evident in burials, house types and artifacts needs to be defined and explained. This analysis answers few questions about Aleut adaptations, economics, land and resource use or social relationships. It has generated a set of archeologically testable hypotheses about Near Island Aleut settlement patterns. All of my conclusions require excavation to verify or disprove. Small sites in particular need attention from archaeologists. Relationships between large and small sites and intragroup contacts are also possible questions for research.

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